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THE

CARPENTER'S ASSISTANT:

CONTAINING

A SUCCINCT ACCOUNT

OF

EGYPTIAN, GRECIAN AND ROMAN ARCHITECTURE.

ALSO, A DESCRIPTION OF THE

TUSCAN, DORIC, IONIC, CORINTHIAN AND COMPOSITE ORDERS;

TOGETHER WITH

SPECIFICATIONS, PRACTICAL RULES AND TABLES FOR CARPENTERS, AND A GLOSSARY OF ARCHITECTURAL TERMS.

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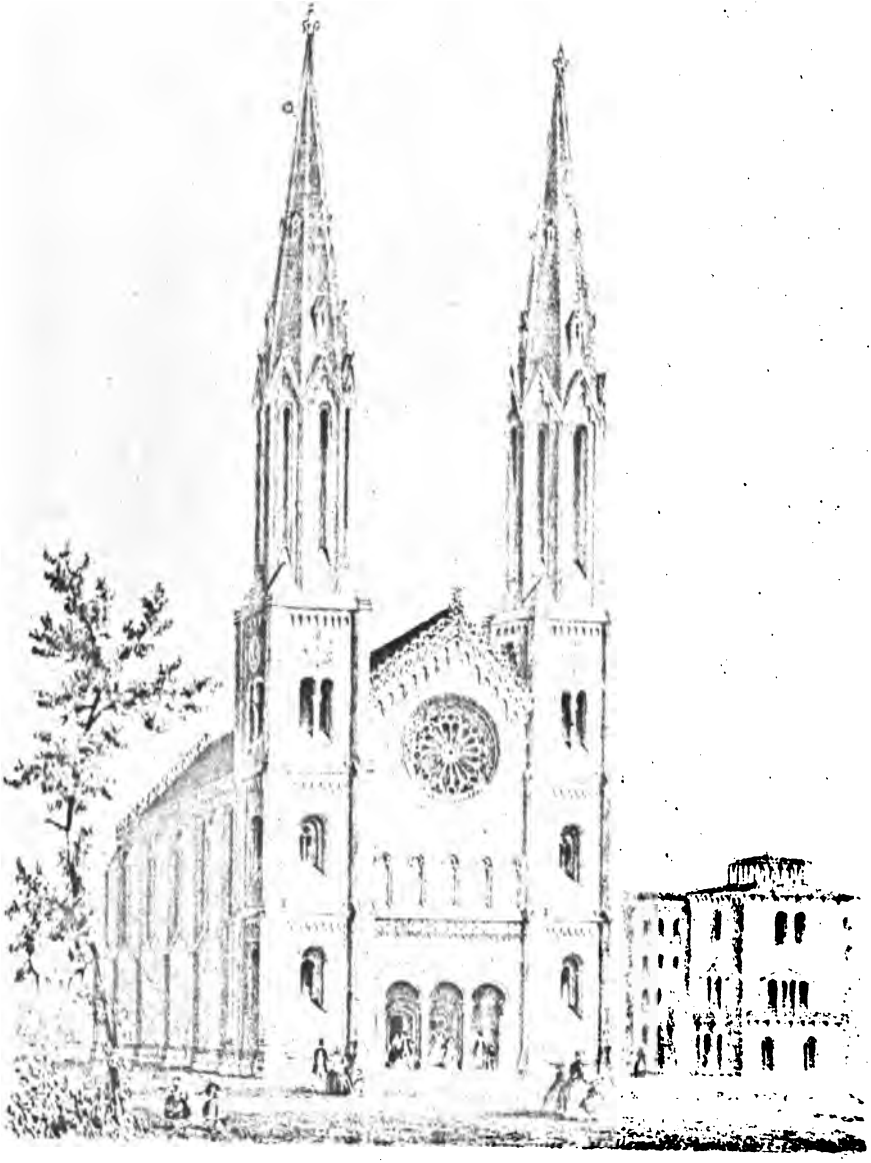

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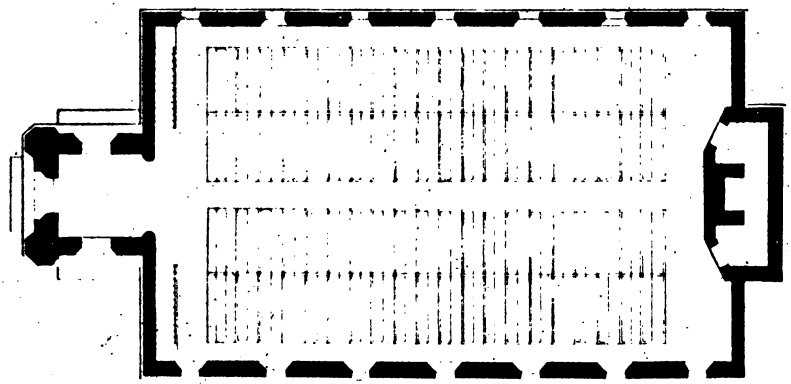

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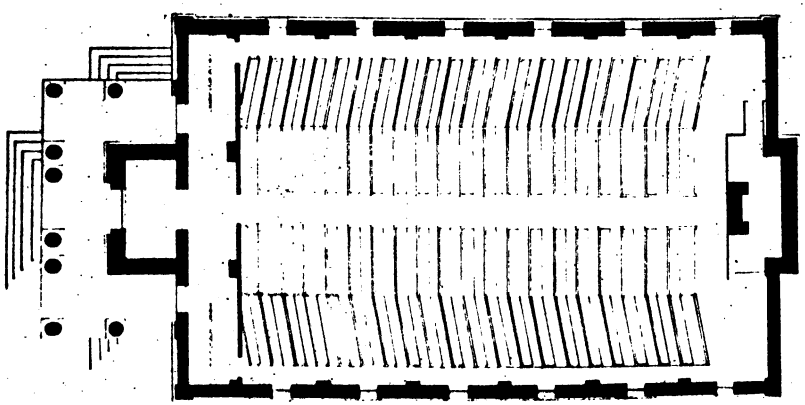

FIG. IV. See Page 116

FIG. II. See Page 116.

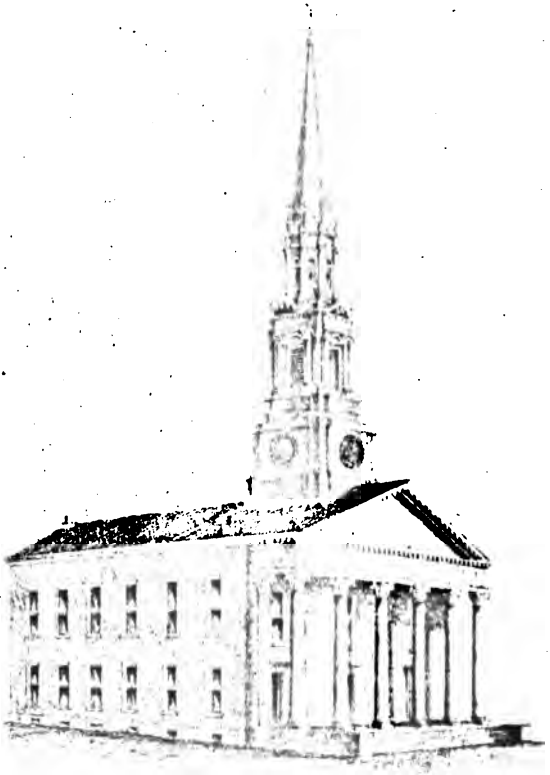

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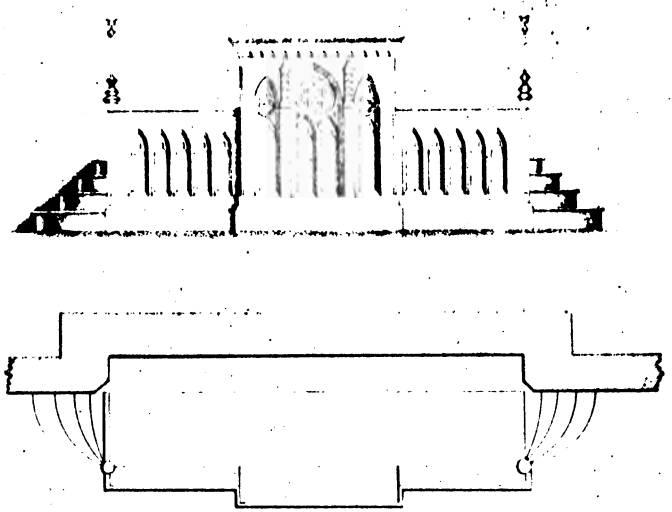
FIG V See Page 116.



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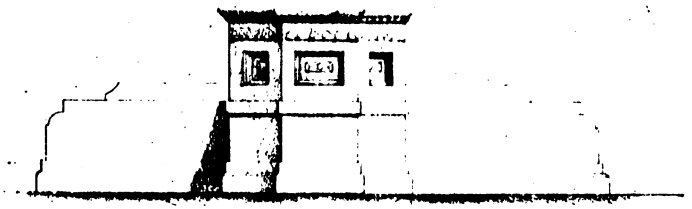

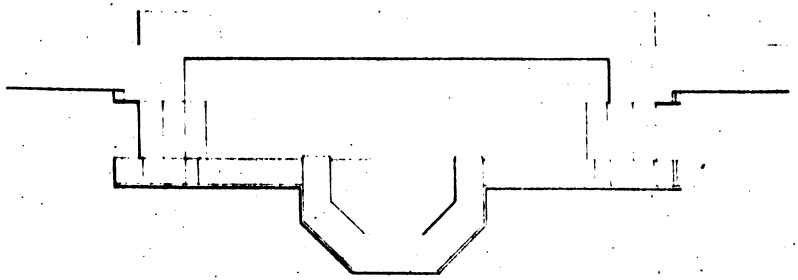

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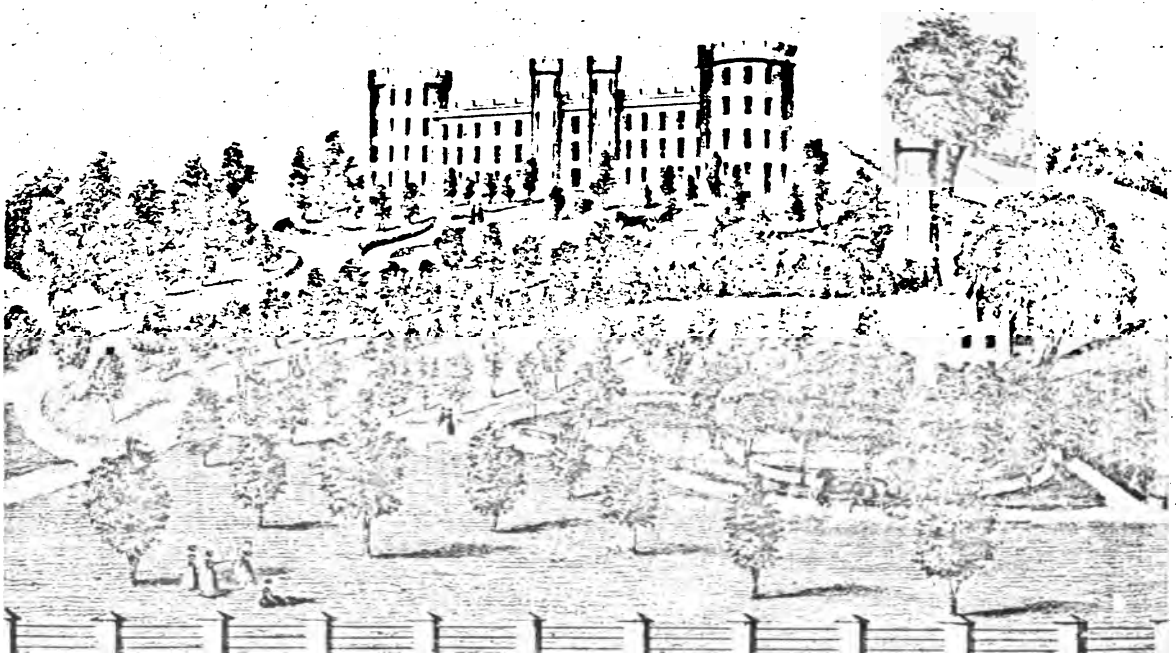


PREFACE.

In preparing this treatise on Architecture, the author has aimed to furnish a work suited to the wants of the carpenter. He has long felt the necessity of such a work, and hoped that some one better qualified than himself would have supplied the deficiency; but, as no one has attempted this task, the author considers it a duty which he owes to his fellow-laborers, to offer them the following treatise.

It is not intended, in this work, to enter minutely into the principles of architecture, for this would extend it to several volumes, and subject those for whom it is mainly designed to unnecessary expense. The author has endeavored, however, to combine, in as brief and concise a manner as possible, all that is absolutely necessary for the student who aims at a practical knowledge of carpentry, and not at finished classical attainments in the study of architecture, either as a science or an art. And he flatters himself that he has done this in a manner so clear and intelligible, that a knowledge of this branch of science may be acquired by the assiduous and careful student, without the assistance of an instructor.

The peculiar advantages of this work are its simplicity, its singular adaptedness to the wants of the carpenter, and its freedom from technicalities, which are so abundant in many treatises of this kind. A few technical words, however, have been admitted, of necessity, because the same idea could not be so well expressed without a tedious circumlocution; but these terms are fully explained in a Glossary which is appended.

In order that the learner may be furnished with some data on which to found his architectural knowledge, who has not the time or the means to examine more extensive works, we have given a short history of the origin of architecture, with a brief account of its three principal styles, namely, Egyptian, Grecian, and Roman; also, a description of the five orders,—

the Tuscan, Doric, Ionic, Corinthian, and Composite. By the aid of this cursory view, he will be enabled to form an idea of the grandeur and magnificence of ancient architecture, and the extent to which a cultivation of the art was carried before the overthrow of the Grecian cities and the downfall of the Roman Empire. He must not, however, deceive himself by supposing that, when he has acquired all the principles contained in this little treatise, he has become master of the whole subject of architecture; for it is one to which the brightest intellect and the most powerful talents might be devoted to a declining old age; and then the individual would exclaim, like the celebrated Newton, "Alas! I have gathered only a few pebbles on the shore of the great ocean of knowledge."

As the student is supposed to have some knowledge of the elements of mathematics, the author has not thought proper to admit anything of this character into the work, with the exception of a few elementary principles of Geometry.

To relieve the carpenter from tedious numerical calculations, several valuable tables are annexed.

It was the design of the author to prepare a treatise adapted expressly to the actual wants of the carpenter, which he, having had many years' experience in practical carpentry, has known and felt; and if he shall have succeeded, in offering the following work, it will not be labor lost, and his object will be obtained.

While preparing this volume, we have been prevented from attending so closely as we could have wished to the revision of our manuscript, and it is possible that a few errors may have crept in from an oversight in the proof. We trust, however, that the book will be found to be as free from inaccuracies as any of its size and character.

WILLIAM BROWN.

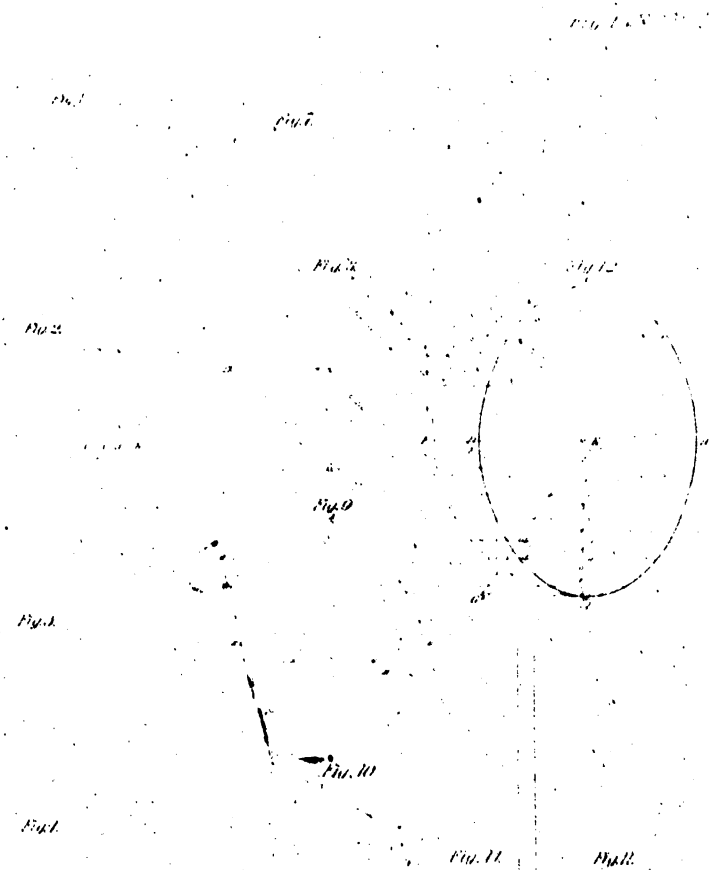


Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 8.
Fig. 9.
Fig. 10
Fig. 11
Fig. 12.

ELEMENTS OF ARCHITECTURE.

PRACTICAL GEOMETRY.

PLATE I.

Fig. 1.—An equilateral triangle, which has three equal sides and equal angles.

Fig. 2.—A triangle with unequal sides, called a scalene triangle.

To describe the figure, the three sides being given:—

Let *ab* be the longest side, *AB*; then, take the length of *ad* in the dividers, and, with one foot on *A*, draw the arc at *D*. Proceed in the same manner with the length *bd*; and, with one foot of the dividers in *B*, make the curve at *D*; through the point of intersection, draw the lines *AD*, *BD*, and the figure is formed.

The equilateral triangle is formed in the same way.

Fig. 3.—A rhomboid, or parallelogram, whose opposite sides are equal and parallel.

Fig. 4.—A rhombus, having four *equal* sides, with two acute and two obtuse angles.

Fig. 5.—An obtuse angle, or one which contains *more* than ninety degrees.

Fig. 6.—An acute angle, or one which contains *less* than ninety degrees.

Fig. 7.—A right angle, or one which contains *just* ninety degrees.

To raise a perpendicular to a given line:—

Let *AB* be the given line, and *D* the centre, making *AD* equal to *DB*; then, open the dividers the distance of *AB*, and intersect the curve lines at *C*. Through the points *C* and *D*, draw the straight line *CD*, and the work is done.

NOTE.—By the term perpendicular it is understood, that any line cutting another line at right angles is perpendicular to that line, let it have what inclination it may. Horizontal means parallel to the horizon.

Fig. 8.—A circle. All circles are supposed to be divided into 360 equal parts, called degrees.

The distance from the centre of a circle to the circumference, is called its radius,—plural radii. The chord and arc of a circle will be understood by a reference to the figure.

NOTE.—A circle, strictly speaking, is the space included within its circumference.

Fig. 9.—A method of measuring any rectilinear figure.

Let *ABCDE* be the given figure; divide it into the three triangles, *ABC*, *ACD*, and *ADE*, by drawing the lines *AC*, *AD*; then, draw *EF* perpendicular to *AD*; *DH* to *AC*; and *BG* to *AC*.

Multiply *AD* by *Ee*, and divide the product by 2: the quotient will be the area of the triangle *ADE*.

Proceed in the same way with all the triangles, and the sum of the several areas will be the area of the figure required.

Fig. 10.—A method of inscribing a circle within a triangle.

Let *ABC* be the given triangle. At the angle *A*, make *Aa* equal to *Ab*; at the angle *B*, make *Ba* equal to *Bp*; at the angle *C*, make *Cc* equal to *Cf*; then bisect *ab*, *ap*, and *cf* in their centres *c*, *d*, and *o*; draw lines from the angles *A*, *B*, *C*, through the centres *c*, *d*, *o*, till they intersect each other, and the point of intersection will be the centre of the circle.

Fig. 11.—An easy method of ascertaining the area of a circle.

Describe a circle of any radius. Let the given radius be *AD*; then, make *AB* equal to the circumference of the circle, and draw the line *BD*, which forms a right angled triangle, *ABD*. Multiply *AD* by *AB*, and divide their product by 2; the quotient will be the area of the circle.

A different method of obtaining the area of a circle will be given in another part of the work.

Fig. 12.—A manner of describing an ellipse by ordinates, the length and breadth being given.

Let *AC* and *BD* be the length and breadth required. With a radius equal to *AE* in the dividers, and one foot in *E*, describe the semicircle *AFC*. Divide *AFC* into any number of equal parts, and draw lines from the points of division at right angles with *AEC*, as at *FED*. Then, draw *BG* parallel to *AC*, and produce the line *GE*. Make *ab*, at *BE*, equal to *ab* at *AG*; and so of all the rest, as at *cd*, *cd*. Trace a curve line through the points where the straight lines cut each other, and the ellipsis will be formed.

Fig. 13.—A method of constructing an equilateral triangle in a given circle.

Let *Ag* be the radius of the circle, and *g* the centre.

With one foot of the dividers on *A*, describe the arc *cgd*; and from the points where the arc cuts the circumference, draw one side of the equilateral triangle. The other sides are drawn according to fig. 2.

Fig. 14.—Two parallel right lines, *AB* and *CD*.

Parallel lines are always equidistant, whether straight or curved.

Plate II.

Fig. 1.—A Roman arch, which is a semicircle.

Fig. 2.—A Saxon arch, in the *form* of a semicircle, the centre of which falls below the springing of the arch.

Fig. 3.—The lancet Gothic arch of the first period of Gothic architecture. It "assumes the outlines of the lancet, or bay-leaf."

The form is simple, and will be readily understood by an examination of the figure.

Fig. 4.—An equilateral arch, which will also be easily comprehended by inspection. This is the arch of the *second* period of Gothic architecture, and is described from abutments of the arch about an equilateral triangle.

Fig. 5.—A depressed Gothic arch, described from centres on the spring-line within the arch.

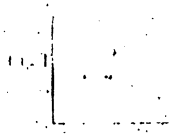
Fig. 6.—A Gothic pointed arch, described from a given height and given width.

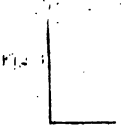
Fig. 7.—A Turkish ogee arch, formed in the mosques of Constantinople.

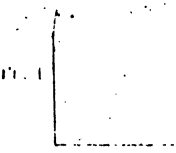
Fig. 8.—A Tudor Gothic arch, which came into use during the reign of that family.

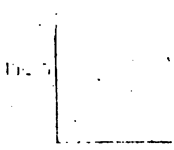
Fig. 9.—A semi-ellipsis, found in the Norman examples.

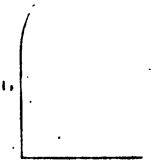
The mode of forming the arches mentioned above, will be understood by an examination of the plate, without any further description.

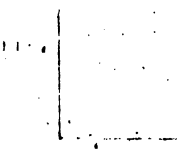


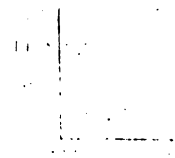


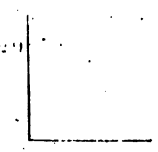












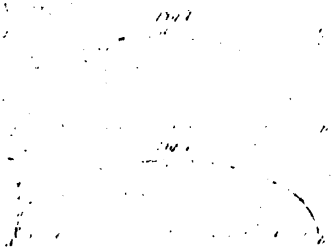


Fig 2

Arch

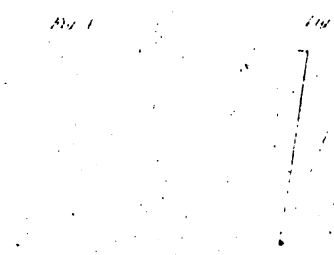


Fig 3

Ellipse

Fig 4

Ellipse

Plate III.

Fig. 1.—A method of drawing a parabolic arch, or curve.

Let *AB* be the height required, and *AD* the length or span. Divide *AD* into any number of equal parts with *a* as a centre; and, also, divide *AB* and *CD* each into one half the same number of parts. Draw lines from the point *a*, in the line *BC*, to intersect with the points of division in *AB* and *CD*. Raise perpendiculars from the points of division in *AD*, to intersect respectively the oblique lines above. Then, trace a curve line through these points of intersection, and the figure is completed.

Fig. 2.—A method of describing a semi-circular arch by intersecting lines. Divide the height into as many parts as may be convenient, and half the length into the same number of parts; then draw intersecting lines, as seen in the figure, and trace a curve line through the points of intersection.

Fig. 3.—A method of describing an *elliptical* arch by intersecting lines.

Let *AB* be the given length, and *AE* the height, and make *ab* equal to *bc*. Divide *AB* into any number of equal parts, and *AE* into one half the same number of parts. Then draw the intersecting lines, and trace the curve line as represented in the figure.

Fig. 4.—To divide the Doric column into flutes.

The Doric column should be divided into twenty parts or flutes.—See the figure. Divide one of the parts into five equal divisions, and make *AC* and *CB* equal. Draw lines from *A* through the points 1 and 4, to *c* and *b*, and divide the line *a A* into five equal parts. With one foot of the dividers at 1, on the line *a A*, and the other at *B*, sweep from *B* to intersect the line *Aad*. Proceed in the same manner with the opposite side; then, with *Ad* for a radius, one foot of the dividers being on *A*, describe the curve line *dc*, and the flute is completed.

Fig. 5.—A section of the Ionic column. The fluting of this column is somewhat different from the other.

The shaft of the column is divided into twenty-four parts, and each of these into five other parts.

One of the five parts being taken for the fillet, the four remaining parts

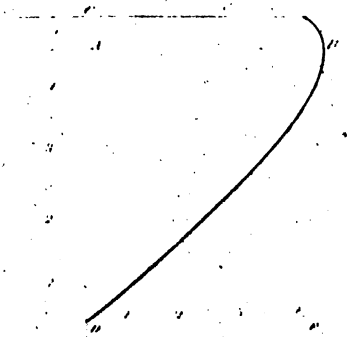
will be the flute. The apex at *A* is found with a radius of three parts, one foot of the dividers being at the points 2 and 4.

The first, or side curve, is described by a radius of one part; the remainder by the radius *A b*.

Fig. 6.—The most simple method of describing an ellipsis.

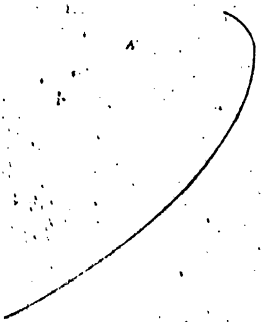
Let *AB* be the length required. Construct two circles which shall extend the whole distance from *A* to *B*; then, with the radius *so*, describe the equilateral triangle *soc* and *sod*, and draw *cs* to *i*, *co* to *f*, *ds* to *r*, and *do* to *b*; also, with the radii *SB* and *o A*, describe the ares *CBi* and *b A f*. Then, with the radii *c i* and *dr*, complete the ellipse, by forming the curve lines *bc* and *fi*.

Fig 1



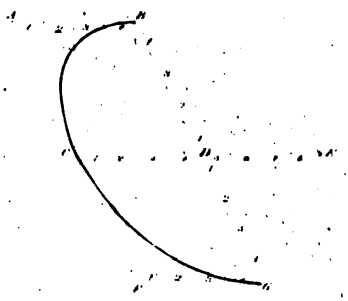
Ovolo.

Fig 2



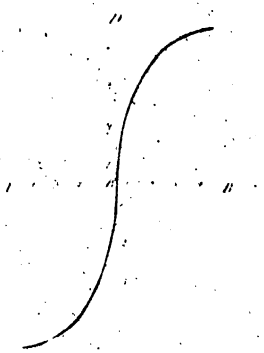
Ovolo

Fig 3.



Scotia.

Fig 4



Cyma Recta.

Plate IV.

On this plate are exhibited four different mouldings of Grecian form and use, developed from the conic sections.

Fig. 1.—A correct mode of describing a hyperbola, the Grecian ovolo, or echinus.

Let *CD* be the height, and *AB* the projection. Make the quirk 5 equal to ⅛ of *CD*. Draw *AE* at right angles with *CD*, equal to twice the projection of the moulding; then, divide *AD* and *DF*, each into an equal number of parts. From the points of division in *AD*, draw lines to the apex *E*; and, also, from the points of division in *DF*, draw lines to *B*. Where these lines intersect each other, trace the curve line *BD*, and the figure is completed.

Fig. 2.—A moulding of the same character, but denominated parabola. This, also, will be understood without a separate description.

Fig. 3. The scotia of the base of a column. To describe this, let *AF* and *BG* be parallel. Make *DE* equal *CD*, and divide *BD* into any number of equal parts; divide, also, *AB*, *CD*, *DE*, *DG*, and *GF* into the same number of parts. Then proceed to draw the intersecting lines, and trace the curve as shown in the figure.

Fig. 4.—The cyma-recta, or crowning moulding of the Grecian cornice.

To describe this moulding, let *AB* be the width, and *CD* the height. Divide it in the centre, both vertically and horizontally, by the lines *AB* and *CD*; then divide *AE*, *BE*, *DE*, and *CE*, each into any equal number of parts. Draw right lines through these points of division, and trace the curve as before.

Second Plate IV.

The number of subordinate parts of an order of architecture is eight. The parts are denominated mouldings, and are common to all the orders.

1. The *quarter round*, *echinus*, or *ovolo*. This is formed by a quadrant, or quarter circle, and is of the Roman character. We will here observe, that the Grecian mouldings were all formed from the conic sections; consequently, no moulding forms any part of a circle. This remark will apply to all the Grecian examples, and it will be unnecessary to repeat it in the explanation of the other mouldings. It is usually found beneath the abacus of capitals, and is commonly placed between the dentils and corona in the Corinthian cornice. It should not be used in situations below the level of the eye.

2. The *ogee*, *reversed cyma*, or *talon*, appears, like the echinus, to be a moulding suitable for the support of another.

3. The *cyma-recta*, *cyma*, or *cymatium*, appears well designed for a covering to the other members. It is properly used for crowning members, though it is frequently found in the bed mouldings beneath the corona.

4. The *torus*, like the *astragal*, is formed like a rope, and appears to be intended to support the part to which it belongs.

5. The *scotia*, which is placed between the fillets that accompany the *tori*, is commonly below the eye. It is used to separate the *tori*, to strengthen the effect of the other mouldings, and to give variety to the base.

6. The *cavetto*, *mouth*, or *hollow*, is a quarter round, like the *ovolo* inverted, and generally used in cornices.

7. The *astragal* is a small *torus*. It is sometimes called a bead.

8. The *fillet*, *listel*, or *cinnulet*, is used in every situation, and at any height. It is chiefly used to separate one moulding from another.

The above described mouldings are of the Roman character, and were usually ornamented, more or less, by sculpture. It requires good judgment and skill to ornament an assemblage of mouldings, to give an easy repose and avoid confusion.

Fig 1

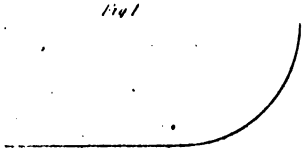


Fig 2

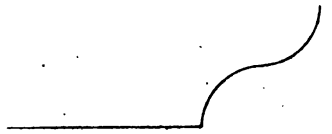


Fig 3

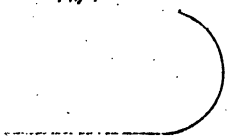


Fig 4

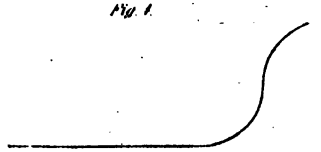


Fig 5

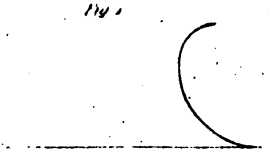


Fig 6

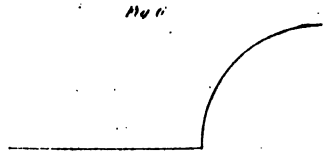
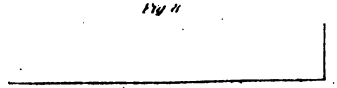


Fig 7

Fig 8



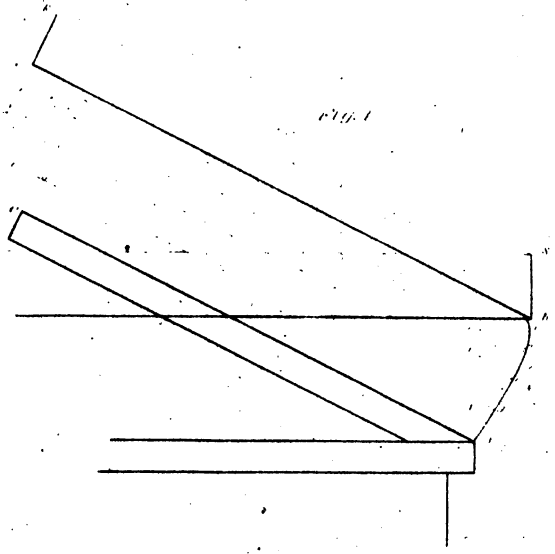


Fig. 1

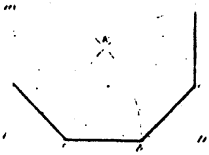


Fig. 2

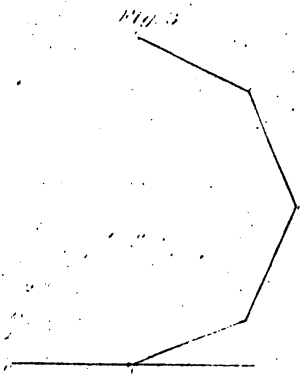


Fig. 3

Plate V.

Fig. 1. — A method of developing a *raking* moulding from a given *horizontal* moulding. Let *AB* be the given moulding. Divide it, on the curve, into as many parts as necessary, equal or unequal, and draw parallel lines *aa*, *bb*, *cc*, and *dd*, at 1; then, transfer those distances to that part of the figure marked 2, and draw the parallel lines *aa*, *bb*, *cc*, and *dd*. Trace the curve line *op*, and the outline is completed.

After getting the inclination of the roof, *RS*, proceed in the same manner with every kind of moulding, and there will be no difficulty in obtaining a moulding which will perfectly correspond with any other in all its parts.

Fig. 2. — A method of forming an eight-square, or octagon, from a given square.

To describe this figure, let *ABCD* be the given square.

With *AE* for a radius, and one foot of the dividers on *A*, form the curve *ab;* then, with the same radius, and one foot of the dividers on *B*, *C*, and *D*, severally, make the three remaining curves.

Then, draw *be*, which will be equal to *bc;* and so on for all the other sides. The construction of this figure will be evident, without any further demonstration.

Fig. 3. — A mode of constructing an eight-square, one side being given.

Let *AB* be the given side. With a radius *AB*, and one foot of the dividers on *A*, describe the semicircle *BOP*. Divide *BOP* into eight equal parts, and draw lines, cutting *BOP* at 2, 3, 4, 5, 6, 7, and 8, to any indefinite length. Then, with *AB* in the dividers, step round the figure *Abcdefgh*, and the octagon is completed.

To draw a figure with any number of sides, proceed in the same manner, remembering to take more or less of the divisions, according to the number in the figure required to be described.

ORIGIN OF ARCHITECTURE.

The natural wants of the human family, and their necessary protection from the severity of the seasons, gave birth to architecture. From the limited account that is left us, little is known of its infancy and subsequent advancement; but enough to show that it kept pace with the progress of civilization, and that, in proportion as peace was secured, and government established, architecture became no less an object of attention than painting and sculpture. It was another means of transmitting to posterity the degree of civilization to which the nations of antiquity attained. The time that has elapsed since those nations, among whom the art was first introduced and practised, have existed, prevents our examining, with nicety, the peculiarities of their dwellings. We find, however, in the architecture of the ancients, the characteristics of three distinct modes of life, which are discernible even at the present day. The three classes to which we refer, and which, probably, were the only classes into which society resolved itself, were hunters, shepherds, and husbandmen. The first class, being mostly in the chase, sought no better habitations than nature provided for her children; namely, the caverns and holes of the rocks. The second, being compelled to wander from place to place, in order to procure food for their flocks, and possessing more refinement than the former, furnished themselves with tents. These were well suited to their purposes, because they were easy of transportation and sufficiently protected them from the inclemency of the weather. The third class pursued husbandry, and, therefore, required dwellings more adapted to the preservation of their productions. Hence, arose low huts, or wigwams, which, perhaps, were not very unlike those of the aborigines of our own country.

The materials which were used in the erection of the buildings of ancient date, were those most easy of access, and such as the nature of the place and the climate afforded. For this reason, reeds, canes, the leaves, bark and boughs of trees were employed. After some knowledge of the metals was obtained, more substantial materials began to be used; and, in the course of time, articles of an inflammable nature came into disuse, especially in the walls of their public buildings.

Bricks, without doubt, were first employed, having previously been

moulded into form and dried in the sun. Then stones; and afterwards, as man became more civilized and learning increased, marble was principally used in the construction of their temples and other splendid edifices.

The construction of the buildings of antiquity needed little skill, and were as simple as the materials of which they were formed. The people possessing less refinement, and being more easily satisfied than those of modern times; had fewer wants to gratify; therefore, they were contented with whatever afforded them a shelter. Accordingly, a few timbers placed above each other, in the form of a square, fastened together at their angles, and covered over with the branches of trees, were all they required.

The architecture of the different countries of the world might with propriety be said to be as different as the people, climate, soil, and productions of the countries themselves; and it would not be improper to give it a name derived from the country which produced it.

For example; the architecture of Babylon, the Babylonian architecture; that of China, the Chinese, &c. But the architecture to which we wish briefly to direct the attention of the reader is that of the Egyptians, to which the present orders of architecture are distinctly traceable.

EGYPTIAN ARCHITECTURE.

THERE were several characteristic features which strikingly marked the architecture of Egypt, and distinguished it from that of any other country; namely, solidity, strength, and durability.

The temples were built in the pyramidic form, and generally without any roof. The walls inclined inward and enclosed large columns, variously arranged. The most splendid and ornate figures of men, beasts, and birds were wrought in their porticos, architraves, and friezes, which clearly evince a great degree of excellence in sculpture. The entrance to their temples was ornamented with colossal statues, sphynxes, obelisks, &c., and the door-way was surmounted with a winged globe.

A uniformity exists in all the Egyptian temples, and other edifices, which is peculiarly striking; and the repetition of the ornaments was carried to the highest pitch of endurance. The greatest irregularity which has been discovered is that found in the island of Philoe; and this is owing, probably, to its peculiar locality. Among the Egyptians, the arch was seldom if ever used.

The absence of it arose, doubtless, from the desire to preserve a uniformity in the structure of their buildings, or from the want of the requisite knowledge of repairing it when injured. But it is a matter of doubt, whether they possessed any idea of the arch at all.

Its place was supplied by heavy lintils, resting upon large, massy pillars.

The Egyptian column, so far as form was concerned, was either circular, polygonal, or square. Of the first kind, the shaft was sometimes nearly plain, but often highly adorned with hieroglyphics.

Sometimes it represented reeds, bound together at short intervals; and, again, an assemblage of reeds encircled by bands, resembling the hoops of a cask.

Square columns are often found in the ruins of many Egyptian temples, cut from solid stone.

Instead of regular columns, like those we have mentioned above, colossal statues were frequently used to support the superincumbent weight similar, in some respects, to the Grecian Caryatides.

The Egyptians displayed as great a variety in the use of their capitals as in their columns.

Of these capitals, we notice three, which may be called, according to a distinguished architect, the *square*, the *vase-formed*, and the *swelled*.

The first, in reality, was nothing more than an abacus; but it was often so high as to admit the sculpture of a human head. The second, as its name implies, resembled a vase; the third curved out in the centre; and each of the three was adorned with the most excellent workmanship.

The entablature of the Egyptians, though unlike that in the architecture of Greece and Rome, was very seldom subdivided, or separated into frieze, architrave, and cornice. The pilaster, like the arch, was also wanting in the architecture of Egypt; and windows were not often used. When they were used, they were of the form of a parallelogram, and little ornamented.

The decorations may be considered as belonging to two classes; namely,—those which are alien to the buildings themselves, such as obelisks and statues, and those which are connected with them, and form, as it were, a part,—such as carving on the entablature, bas-reliefs, &c. The first class of these ornaments is distinguished for the size and durability of the materials which compose it.

The statues of colossal proportions, usually in a sitting posture, are detached from the exterior of the temples, and rest on simple pedestals.

Painting was only another method of ornamenting; but the taste exhibited here, as in coloring or drawing, was not better than that displayed in their sculpture.

The leaf of the palm-tree, and plants of almost every kind which the country produced, were carved in the Egyptian capitals. On the entablature and other parts we occasionally find animals of nearly every description, elegantly sculptured; and there is scarcely a building, of any size, where the winged globe is not to be found. The object of the globe, and of all the decorations on the Egyptian temples, was to typify the divine attributes of the Deity, of whom the people had but an imperfect idea.

The exploits of their kings, and large portions of history, were embodied in the sculpture on the walls.

The proportion which is necessary in the different parts of a building in relation to the whole, is not so discernible in the Egyptian architec-

ture as in the Grecian. This disproportion is most distinctly noticed in pyramids and temples.

The private buildings, though less adorned than the magnificent structures which have withstood the ravages of time, are, nevertheless, not destitute of ornament. They varied, of course, in their locality and size.

From this mode of architecture, as we have intimated above, all the orders, namely, the Tuscan, Doric, Ionic, Corinthian, and Composite, can be easily traced.

A description of these orders will be given in the succeeding pages.

GRECIAN ARCHITECTURE.

Temples were the principal structures erected by the Grecians. In order to give the student some idea of the number, magnitude, and distinguishing characteristics of those elegantly enriched and highly ornamented edifices, which were the adornment of Athens and other Grecian cities, we will mention the names of a few of the principal ones.

The chief of the Grecian-Doric examples are, the Parthenon, Temple of Theseus, and the Portico of Augustus, at Athens; the Ennenstyle, Hexastyle, and Hypæthral Temples, at Pæstum; the Temple of Juno Lucina, and Concord, at Agrigentum; the Temple of Minerva at Sunium; the Temple of Apollo, and the Portico of Philip of Macedon, in the isle of Delos; the Temple of Jupiter Panhellenius, at Egina; the Temple of Juno, at Samos; the Temple of Bacchus, at Teos; of Apollo Didymæus, at Miletus, and of Minerva Polias, at Priene. We might name others, did our limits permit, but these are sufficient for our present purpose. The last four of these examples are of the Ionic order. The first two in the list, namely, the Parthenon and Temple of Theseus, are the most splendid examples of the Grecian-Doric order.

From the examples here given, we may readily infer that a taste for elegance and grandeur, with simplicity of arrangement and ornament of parts, was cultivated to an extent never excelled, and seldom equalled. This is not surprising, when we recollect that those massive edifices were erected by the joint expenditure of all the Grecian States, and supported out of immense revenues and munificent donations.

The influence of the principles of Grecian architecture stretched along the coast of Asia Minor, entered Egypt, and, probably, followed the conquest of Alexander into India itself on the East, and to the country of Italy and the Sicilian lands on the West.

In the article on Egyptian architecture, we stated that the temples and public edifices of Egypt were decorated with figures of men, beasts, birds, &c., carved upon the frieze, architrave, and walls, and in numerous other places. The same is true in the Grecian architecture; but the temples were not the only buildings in Greece that were enriched by sculpture and art. Many of the monuments, theatres, and tombs were magnificently adorned, as were, also, their fora and stadia.

The ancient temples have been divided into seven classes, viz.—1, in antis; 2, prostylos; 3, amphiprostylos; 4, peripteral; 5, dipteral; 6, pseudo-dipteral; 7, hypæthral.

For a knowledge of these species, the student is referred to Stuart's Antiquities, where he will find an example of each, and its description.

Besides the names we have given above, the temples had other names, depending upon the distance between their columns. The intervening space is called intercolumniation, and is measured by the lower diameter of the shaft. When it is one diameter and a half, it is called pycnostyle; when two, systyle; when two and one fourth, eustyle; when three and one fourth, diastyle; and when four, araeostyle. The eustyle was generally practised by the ancients, and is in use at the present day.

In hypæthral temples, that is, temples whose cells are not covered, columns were sometimes placed within the walls, on the four sides; but, frequently, although within the walls, they were only on the long sides, and took the name peristyle.

Occasionally, the intercolumniation was not regulated by the diameter, but by the triglyphs; and, if only one triglyph intervened, the mode was styled monotriglyph.

This mode was more frequently employed than any other in Grecian architecture.

In the Grecian temples, the number of columns on each flank was one more than twice the number on the front; that is, if there were six columns in front, there would be thirteen on the sides, reckoning the column at the angle in both ranges. The exterior row of columns, with the entablature, standing upon a platform ascended by three steps, entirely surrounded the edifice. The pediments, frieze, and walls beneath the portico, were often wrought with the most excellent sculpture.

Writers on the subject of architecture have so universally considered the hut as a symbol of columnar architecture, which is identical with the Grecian, that, although we have not satisfied ourself in regard to the correctness of the theory, we have not ventured to substitute a new one.

The posts which were driven into the ground to support the roof gave origin, doubtless, to the detached Grecian column. The flutings, or grooves sunk into the shaft of the column, were said to be made for the purpose of affording a place for the spears of persons entering the temples. It is also said that the "folds of a matronal garment" led to their invention. This, however, does not appear to account satisfactorily for their origin, since we are led to suppose that the ancients were acquainted

with the fact, that light striking upon a curved surface produces a much greater effect than it does when it falls upon a plain surface. But from whatever source they originated, one thing is certain, they were invented when architecture was in its infancy, and give an additional beauty to the column.

As the ancients wished to build temples with columns, and being ignorant of the proportions necessary to support the superincumbent weight, they resorted to the expedient of measuring the height of a man, and having found his height to be six times the length of his foot, they made application of this fact in the erection of the Doric column, giving it a height equal to six times its diameter. In the temple of Diana, which was built afterwards, on similar principles, they varied the proportion, and made the height of the column *eight* times the diameter, instead of *six*, in order to give it a more lofty appearance. At a later period, the Doric column was made *seven* diameters high, and the Ionic *eight and a half*.

There are several points of difference existing between the Grecian and Roman styles of architecture, which it may be well to state in this connection. The contour of a moulding, in the former style of architecture, was formed from the conic sections; and the contour of a moulding, in the *latter* style, from circles. The dome and arches were found among the Romans, but not among the Grecians; for the columnar style of architecture used by them rendered the arch unnecessary.

The Grecian architects of modern times, however, have endeavored to introduce the Roman arch, with the Greek form of architecture; but, in every case, the attempt has proved unsuccessful.

ROMAN ARCHITECTURE.

It cannot properly be said, that the Romans possessed any original architecture; what they had was little else than a modification of that of Greece.

They were instructed in this science by the Etrurians, a people of Italy, during the reign of the Tarquins. At this time, their edifices were constructed more on fixed principles, and received considerable enrichment by means of sculpture.

The first Tarquin, who was a native of Etruria, after having gained several victories, enjoyed a triumph; and the wealth he obtained from the conquered cities he appropriated to the erection of magnificent temples and halls of justice. During later successful reigns, great additions were made to the knowledge of architecture possessed by the Romans, and, also, many modifications in the construction of their public edifices, and private buildings. We shall not, however, attempt to trace all the different changes and alterations which are to be found in the progress of Roman architecture, for that would extend this chapter very far beyond suitable limits, and encroach upon ground that does not properly belong to a work of this description.

Architecture was but partially understood by the Romans, until their victorious arms had made Greece a Roman province, and then it received a new, if not its first impulse; but it was not till after a succession of victories, that architecture reached its full height, and made Rome, the Eternal City, what it was.

Statues of the most elegant sculpture, and all the luxury of ornament which the age and country of Greece afforded, poured into the Roman villas, which, at this time, were of considerable extent. No decoration which Greek art could furnish was unobserved in the erection of Roman edifices.

The temples of the Romans generally resembled their Greek original; but, occasionally, there was considerable departure from the Grecian style. These deviations, however, were very few, and, in some respects, little calculated to become a favorite, since they did not always produce a happy effect. The most splendid temple of the Corinthian order that ever existed in Rome, and probably in the world, was that of Jupiter Stator,

in the Campo Vaccino. Recent discoveries have shown that it was an octastyle peripteral temple, having twelve columns on the side; and the depth of the cell contained eight columns, with their intercolumniations. The capitol, both in design and ornament, surpassed anything of the kind that had ever been executed before.

Not far from the temple just described, is the Temple of Jupiter Tonans, of the Corinthian order. This was a hexastyle peripteral, and much inferior to the Temple of Jupiter Stator; this, however, was not without beauty, although, in the cornice, it was very deficient, in comparison with the one just named.

The Temple of Mars Ultor, also built by Augustus, was a fine example of the Corinthian order. Notwithstanding the temples we have mentioned are all of the Corinthian order, we do not intend to convey the idea that the Romans made use of none of the other orders. The whole of the five orders were generally employed by them, but they underwent several alterations in their hands.

THE ORDERS OF ARCHITECTURE.

An order of architecture is a system or assemblage of parts subject to certain uniform established proportions and divisions. The proportions are regulated by the several services or offices which they have to perform, requiring strength. An order may be considered the "genus," of which there are five *species*, namely, the Tuscan, Doric, Ionic, Corinthian, and Composite orders.

The grand divisions of an order consist of a column and entablature; these are subdivided into assemblages, as follows; viz., the base, shaft, capital, architrave, frieze, and cornice.

The Grecians had three orders of temple architecture; namely, the Doric, Ionic, and Corinthian. The Grecian-Doric orders lay claim to the greatest antiquity, and had their origin in Asia. They were invented or composed by the Asiatic Dorians, who, without doubt, borrowed their ideas from the Egyptians, with whom they had intercourse.

THE TUSCAN ORDER.

We begin our description of the orders with the Tuscan, which is considered the most massive.

This order was invented in Etruria, a country of Italy, now called Tuscany; hence, the Etruscan or Tuscan order. "It is formed upon the model of the ancient Doric, with such alterations as suggested themselves to the architects of those days. The chief of these consisted in the alteration of the proportions of the shaft, and in making it plainer, and with a base. It was never fluted, and the column contained seven of its diameters in height."

"It is generally known as the Vitruvian Tuscan."

ROMAN DORIC ORDER.

The Doric order was originally formed by the Dorians, but it was so modified by the Romans as to differ in appearance from the same order

employed by the Grecians. In some edifices the shaft was fluted to nearly two thirds its height, with twenty aris flutes, the lower third being left plain; in others the whole length of the shaft was fluted. The column contains eight of its diameters in height, with mouldings at the base.

ROMAN IONIC ORDER.

The Ionic order has less sublimity than the Doric, but more elegance. Its capital is better enriched with ornaments. It is supposed this order was founded upon the imitation of the female form, and that the proportions of the Doric order were obtained from those of the male form.

The base of the column was designed to represent a shoe; and the capital had a curling ornament, called a volute, said to resemble the tresses of the hair, falling to the right and left.

The column is nine of its diameters in height, and has flutes and fillets.

ROMAN CORINTHIAN ORDER.

The Corinthian column is slenderer and more adorned than either the Doric or Ionic, and its elegant capital adds greatly to its appearance.

The column has fillets and flutes, and its altitude consists of ten of its diameters.

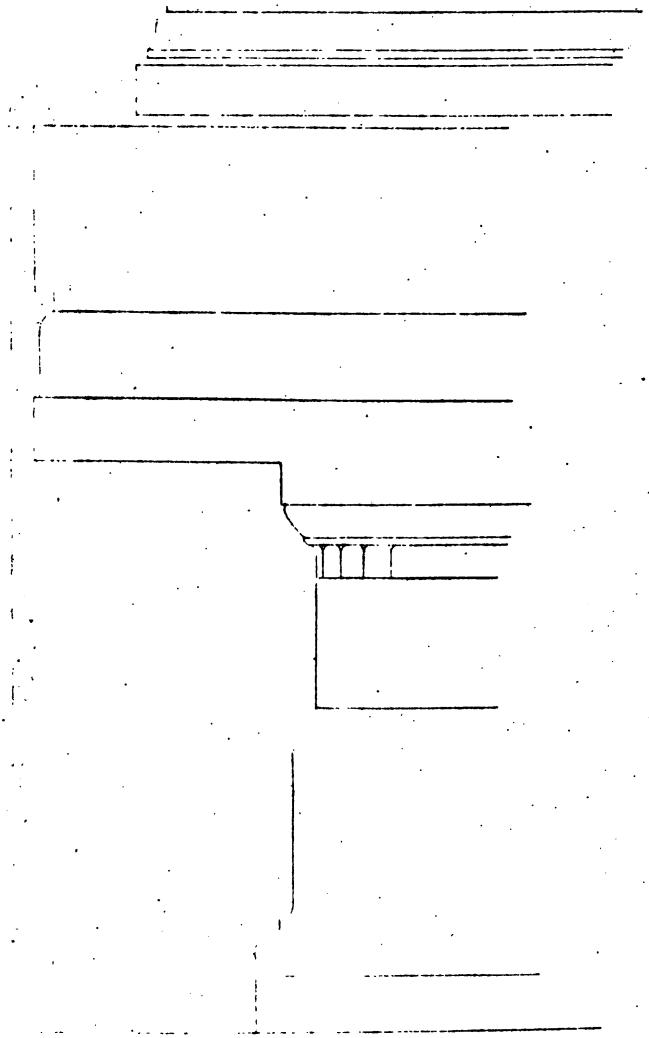
ROMAN COMPOSITE ORDER.

The most ornamented of the five orders was the Composite. It was composed from the Corinthian and Ionic, and was much employed in the public buildings of the Roman capital in the reign of Titus. This column also has flutes and fillets, and its altitude is the same as the Corinthian. The frieze is adorned with excellent sculpture.

In concluding our observations on these orders, we quote the following language:—

"According to the rules of true taste, these orders ought never either to be blended or found in different proportions on the same story; nor ought the same order, strictly speaking, to be introduced in two stories of

the same building. And where two or more orders are employed in an edifice, the heaviest should occupy the base, surmounted by the others, according to their successive lightness, which contributes the greatest elegance of style, and gives that harmony to the general design, for which the ancients were so particularly distinguished."



TUSCAN ORDER.

Plate VI.

We have here given an example suitable for practice, as approved by Benjamin; and, also, for the purpose of showing how to draw and adapt this order to any required position, the following

RULE.

First ascertain the required height, and divide it into nine equal parts; take one of these parts for the diameter of the column just above the base; this is called the diameter. Make the column, including base and capital, seven diameters high, and the entablature, which includes all above the capital of the column, two diameters high.

To make the subdivisions, minutes, &c.:—

In the first place, take one diameter and divide it into sixty equal parts. This may be done by dividing the diameter, which in the example is 11 inches, into five equal parts, each being 2 of an inch. Then divide one of these parts into twelve equal parts. This is easily done by dividing one eighth of an inch into four parts, or one sixteenth into two parts.

These divisions, whether large or small, are called minutes. Then, for the height of each member in the order, give the number of minutes marked opposite in the column under *H*, (height); and for the projection, give to each member the number of minutes marked under *P*, (projection.) These projections are given from the face of the frieze in the entablature, and from the outside of the top and bottom of the shaft of the column.

This rule will apply to all the orders, with the exception of a variation of diameters in height. The names of the different grand divisions, given in the example of the Doric order, are applicable to the grand divisions of all the orders.

THE Frontispiece of this work gives a view of the buildings and extensive grounds of Orcad Institute, Worcester, Mass.

It was founded by Mr. Eli Thayer, in 1849, as a Female University. Located on a lofty eminence, about half a mile north of the City Hall, and commands an excellent view of the city and the adjacent country. The buildings are constructed of dark slate-stone, and covered with stucco.

DORIC TEMPLE.

Plate VII.

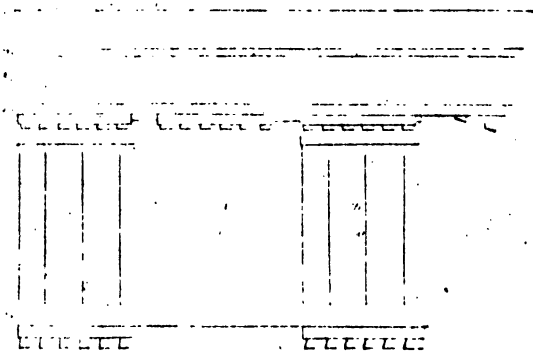
On this plate is exhibited an elevation of a Grecian Doric Temple, in order to give the student a correct idea of the position of all its members. Their names are given on Plate 8.

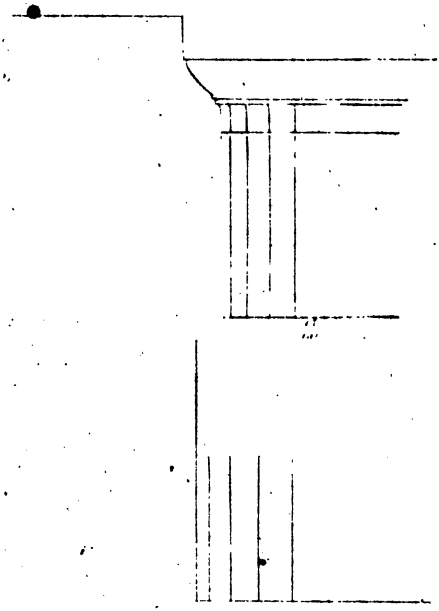
No. 1.

The front elevation is shown in Fig. No. 1, and is a beautiful design for a house of comparatively small expense.

The following figure, No. 2, is a plan for the arrangement of a flower-garden.

No. 2.





DORIC ORDER.

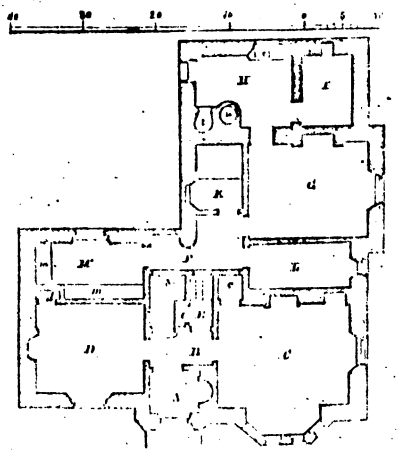
Plate VIII.

This plate exhibits a part of the column and entablature of the Doric Temple on Plate 7.

This is drawn to the same scale as the Tuscan order, and figured in the same way.

The grand divisions, namely, shaft of column, capital, architrave, frieze and cornice, are marked at the left of the plate; and each of these divisions is subdivided into members, the names of which are given, and their sizes figured in minutes. See the Glossary for the definition of terms used in this work.

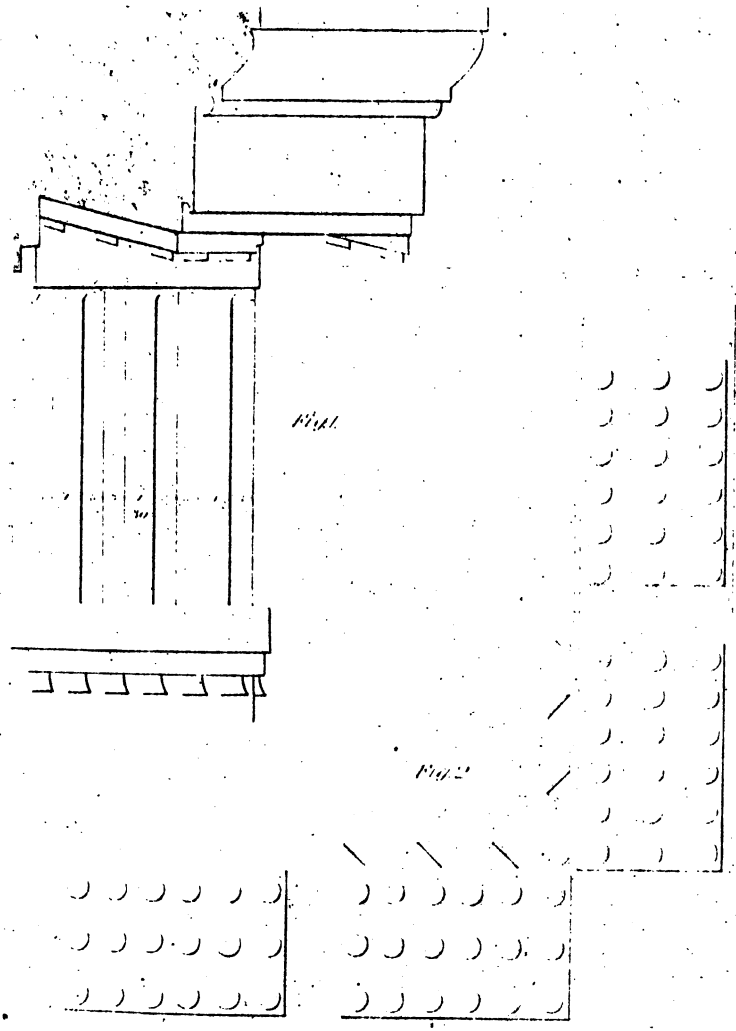
No. 3.



THE ground-plan of the foregoing elevation is seen in Fig. 3. (A) vestibule, (B) lobby, (C) sitting-room, (c) closet, (D) parlor, (d) closet, (E) passage under the stairs, (e) closet, (I) back passage, (K) kitchen, (H) back kitchen or wash-room, (s) sink, (f) oven, (a) boiler, (c) coal or wood-house, (K) bedroom, (L) store-closet, or pantry, (M) milk-room, (m, m,) stone shelves, (N) closet under the stairs.

No. 4 represents an elegant plan for a summer-house, with rustic columns, around which vines or climbing roses may be trained.

No. 4



DORIC DETAILS.

Plate IX.

Fig. 1.—**Sections of the cornice, triglyph, &c.**

Fig. 2.—**A plancer inverted, also the mutules and triglyphs on a large scale.**

For the figuring of this plate, see Plate 8.

The minute on this plate is $\frac{1}{2}$ of an inch; and on Plate 8, $\frac{1}{32}$.

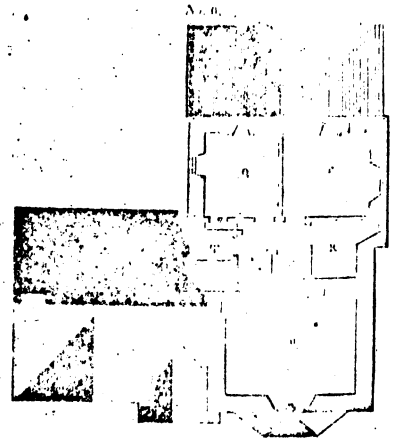
Study and close examination will enable the student to understand this order without any further explanation. We do not intend to give a full and minute representation of all the orders, for this work is designed, more particularly, for practical purposes; but the orders are *shown* merely to give the learner some general knowledge of them, and to enable him to readily make a proper distinction between them.

No. 5.

No. 5, as above, represents a side elevation of the same house.

The upper floor, as seen in No. 6, may be explained as follows: (s) stair-landing, (o, p, q, r,) bed-rooms, (v) store-closet, (t, u,) also for closets.

No. 6.



DORIC TEMPLE.

Plate VII.

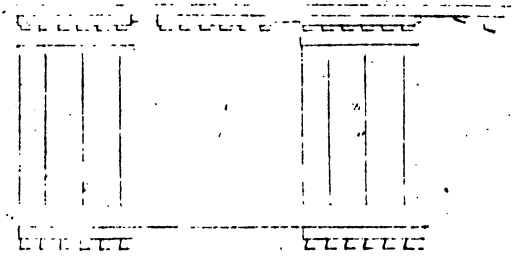
On this plate is exhibited an elevation of a Grecian Doric Temple, in order to give the student a correct idea of the position of all its members. Their names are given on Plate 8.

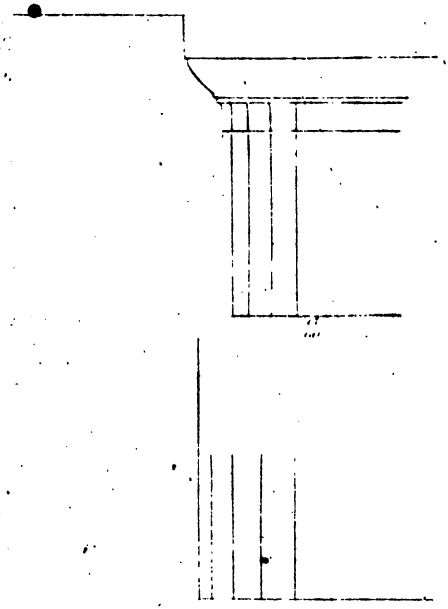
No. 1.

The front elevation is shown in Fig. No. 1, and is a beautiful design for a house of comparatively small expense.

The following figure, No. 2, is a plan for the arrangement of a flower-garden.

No. 2.





DORIC ORDER.

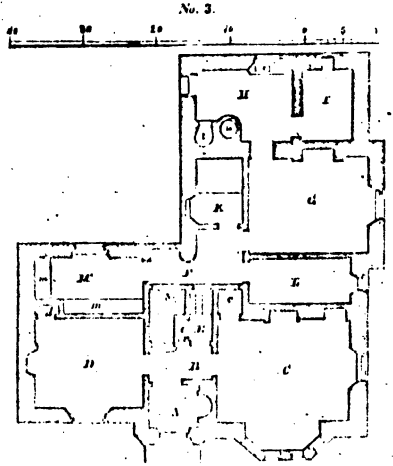
Plate VIII.

This plate exhibits a part of the column and entablature of the Doric Temple on Plate 7.

This is drawn to the same scale as the Tuscan order, and figured in the same way.

The grand divisions, namely, shaft of column, capital, architrave, frieze and cornice, are marked at the left of the plate; and each of these divisions is subdivided into members, the names of which are given, and their sizes figured in minutes. See the Glossary for the definition of terms used in this work.

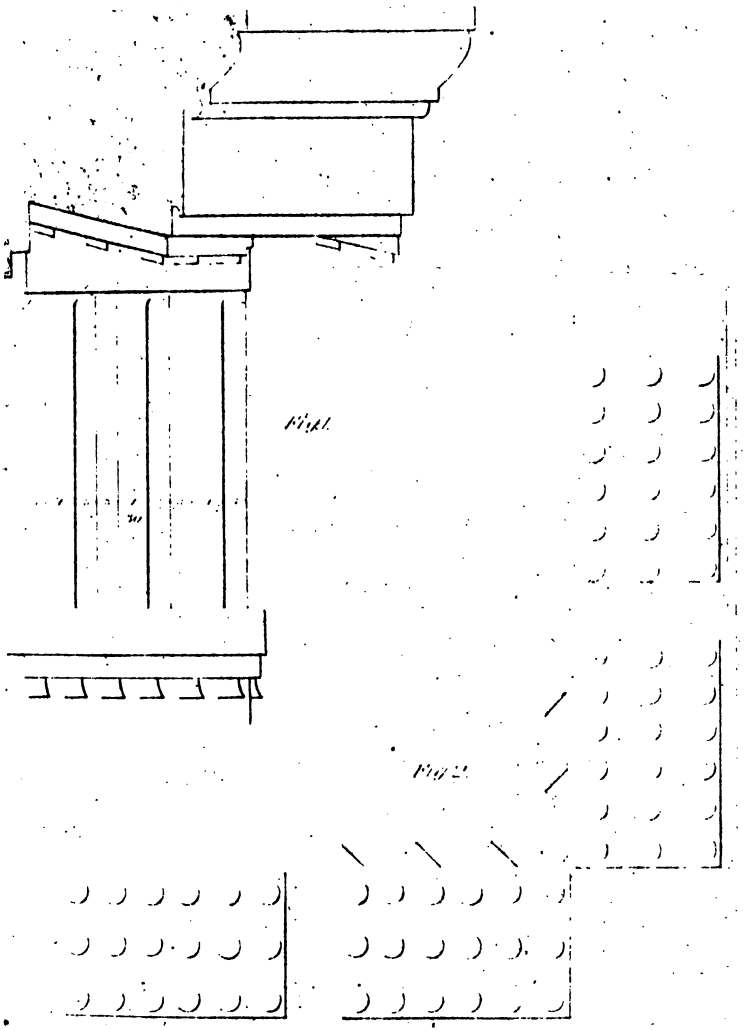
No. 3.



The ground-plan of the foregoing elevation is seen in Fig. 3. (A) vestibule, (B) lobby, (C) sitting-room, (*c*) closet, (D) parlor, (*d*) closet, (E) passage under the stairs, (*e*) closet, (I) back passage, (G) kitchen, (H) back kitchen or wash-room, (S) sink, (*l*) oven, (*u*) boiler, (I) coal or wood-house, (K) bedroom, (L) store-closet, or pantry, (M) milk-room, (*m*, *m*,) stone shelves, (N) closet under the stairs.

No. 4 represents an elegant plan for a summer-house, with rustic columns, around which vines or climbing roses may be trained.

No. 4



DORIC DETAILS.

Plate IX.

Fig. 1.—**Sections of the cornice, triglyph, &c.**

Fig. 2.—**A planeer inverted, also the mutules and triglyphs on a large scale.**

For the figuring of this plate, see Plate 8.

The minute on this plate is $\frac{1}{4}$ of an inch; and on Plate 8, $\frac{1}{32}$.

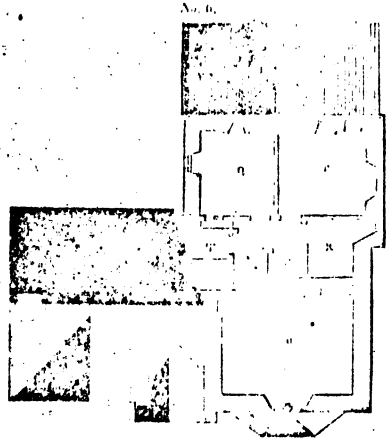
Study and close examination will enable the student to understand this order without any further explanation. We do not intend to give a full and minute representation of all the orders, for this work is designed, more particularly, for practical purposes; but the orders are *shown* merely to give the learner some general knowledge of them, and to enable him to readily make a proper distinction between them.

No. 5.

No. 5, as above, represents a side elevation of the same house.

The upper floor, as seen in No. 6, may be explained as follows: (s) stair-landing, (o, p, q, r,) bed-rooms, (t) store-closet, (, , ,) also for closets.

No. 6.



DORIC ORDER.

Plate VIII.

This plate exhibits a part of the column and entablature of the Doric Temple on Plate 7.

This is drawn to the same scale as the Tuscan order, and figured in the same way.

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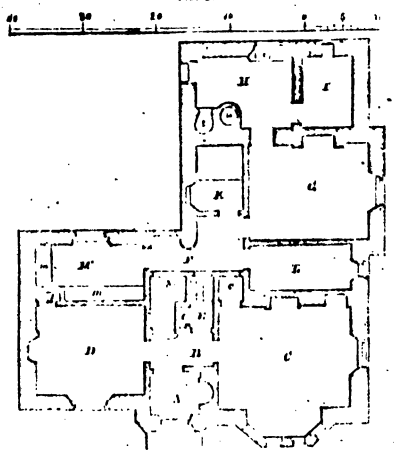
No. 3.



The ground-plan of the foregoing elevation is seen in Fig. 3. (A) vestibule, (B) lobby, (C) sitting-room, (*c*) closet, (D) parlor, (*d*) closet, (E) passage under the stairs, (*e*) closet, (F) back passage, (G) kitchen, (H) back kitchen or wash-room, (*s*) sink, (*f*) oven, (*a*) boiler, (I) coal or wood-house, (K) bedroom, (L) store-closet, or pantry, (M) milk-room, (*m*, *m*,) stone shelves, (N) closet under the stairs.

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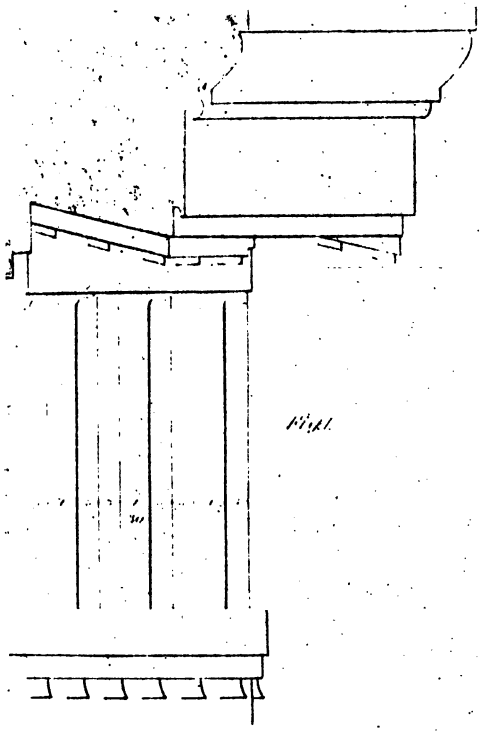
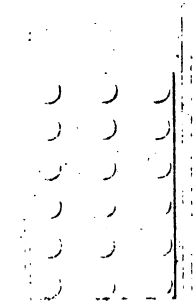
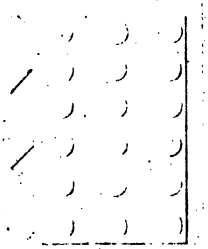
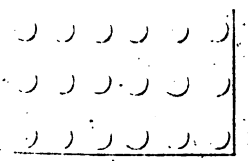
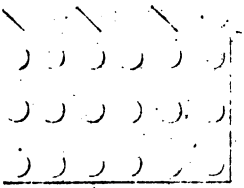
No. 4











DORIC DETAILS.

Plate IX.

Fig. 1.—**Sections of the cornice, triglyph, &c.**

Fig. 2.—**A plancer inverted, also the mutules and triglyphs on a large scale.**

For the figuring of this plate, see Plate 8.

The minute on this plate is $\frac{1}{2}$ of an inch; and on Plate 8, $\frac{1}{32}$.

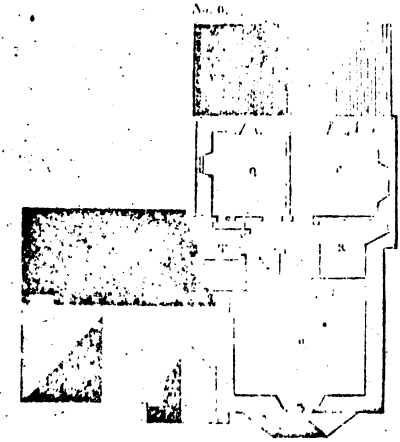
Study and close examination will enable the student to understand this order without any further explanation. We do not intend to give a full and minute representation of all the orders, for this work is designed, more particularly, for practical purposes; but the orders are *shown* merely to give the learner some general knowledge of them, and to enable him to readily make a proper distinction between them.

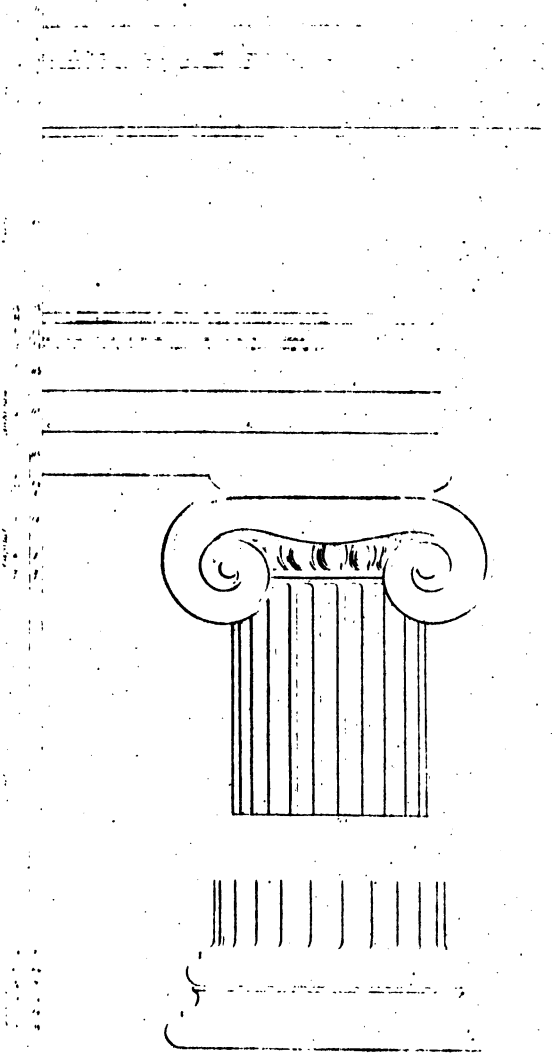
No. 5.

No. 5, as above, represents a side elevation of the same house.

The upper floor, as seen in No. 6, may be explained as follows: (N) stair-landing, (P, P, P, P,) bed-rooms, (C) store-closet, (C, C,) also for closets.

No. 6.





IONIC ORDER.

Plate X.

This Order owes its rise *to*, and took its name *from*, the Ionians of Asia Minor, who, in their cultivation of architectural taste, introduced into their country the new form which peculiarly distinguishes the Ionic Order, namely, the spiral volute.

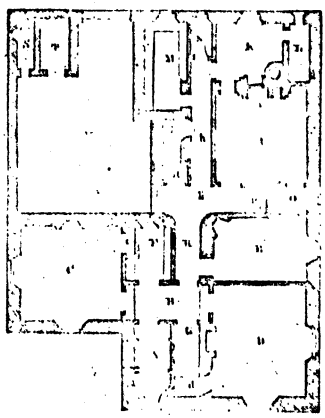
This was the second of the Grecian orders in point of time. The column was, as a general thing, made eight diameters in height, always standing upon a base of mouldings, which differs in the outline in different orders. The shaft of the column usually diminishes about ten minutes. The entablature was made two diameters high; the column was divided into twenty-four flutes, each separated by a fillet of one part; the flute consisting of four parts. The capital always maintained the same character, but varied, in form and richness of ornament, in the different examples.

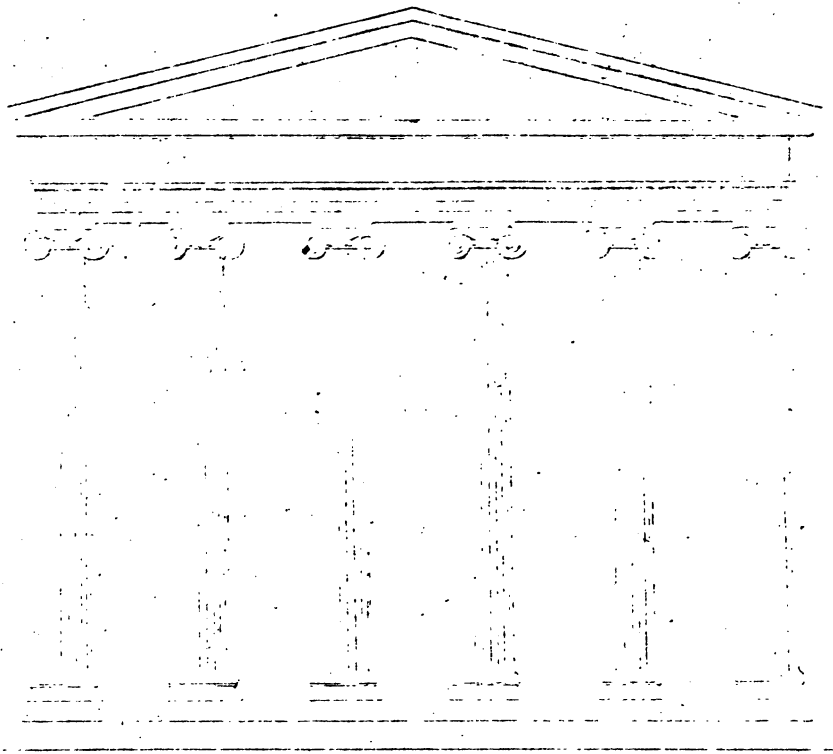
The capitals of the Temple of Erectheus, at Athens, were highly ornamented and very beautiful; while the little Temple on the river Ilissus was very plain; yet its classical beauty and harmony of parts were never excelled.

No. 7.

Elevation for a large farm-house. The design is seen in No. 7, in which all the main parts of the building are raised to the height of two stories.

The ground-plan is shown in No. 8, as follows: (a) is the vestibule, (b) hall, (c) parlor, (d) sitting-room, (e) dining-room, (f) store-room, (g) stairs, (*h*) passage, (h, h,) back passage, (i) kitchen, (l) wood-house, (m) milk-room (n) pantry, (o) closet, (p) closet, (q) closet, (r) kitchen-yard, (s) pi[illegible] (s) water-cl[illegible]





IONIC TEMPLE.

Plate XI.

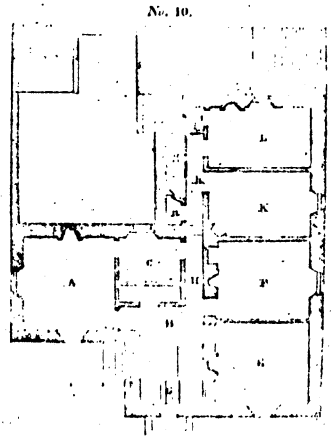
On this plate is represented an Ionic Temple, merely to show the contrast in the different styles of architecture, and to give the student the means of discriminating, at once, between the several orders. This is drawn to the same scale as the Doric Temple, Plate 7.

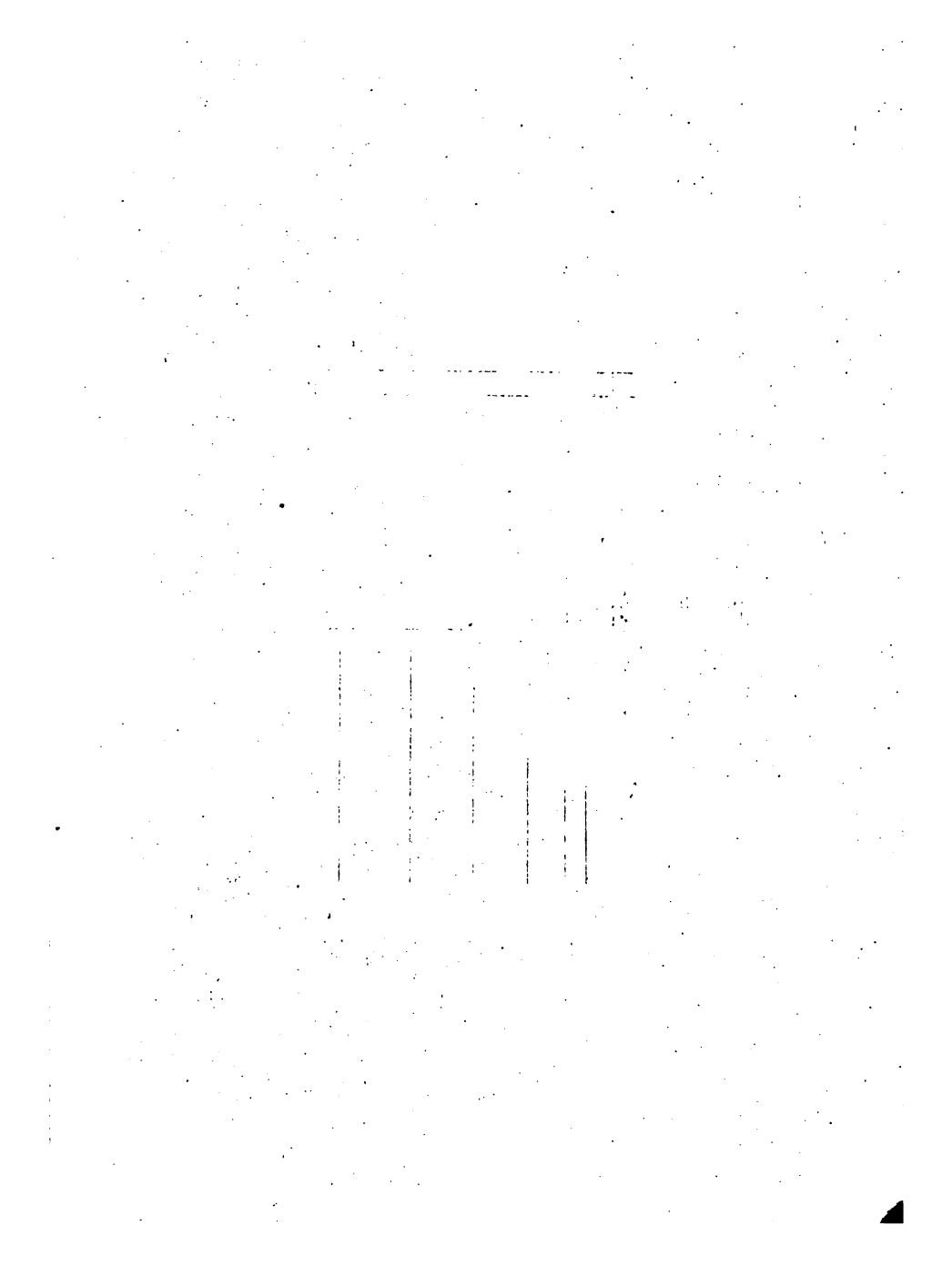
No. 9.

No. 9, as above, represents the side elevation of the same house, as seen in front elevation No. 7.

The upper floor is shown in Fig. No. 10. (B) stair-landing, (A, E, F, K,) bed-rooms, (g) principal stairs, (H) passage, (c) dressing-room, or room for various purposes, (g) back stairs, (n) closet, (L) bed-room (I) closet, (h) landing of back stairs.

No. 10.





IONIC DETAILS.

Plate XII.

Shows the volute and a section of the column. A minute here is $\frac{1}{16}$ of an inch The numbers 12, 11, 10, and so on down to 1, are centres. Take 12 as a centre and sweep from *A* to *B*; with 11 as a centre, sweep from *B* to *C*; and so on, till the volute is completed.

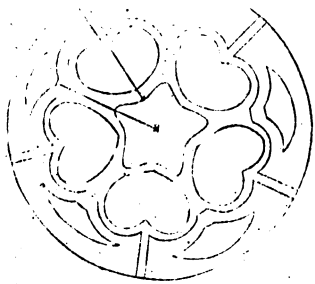
No. 11.

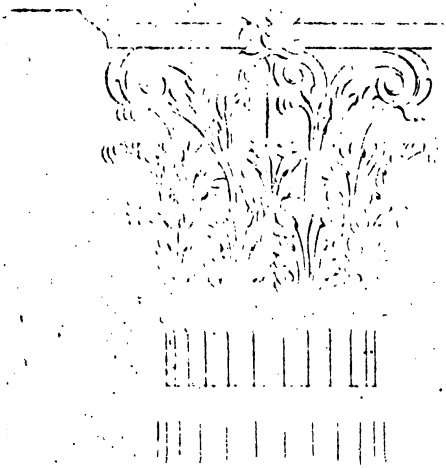
TIMBER VILLA, IN THE GOTHIC STYLE.

This building is now in process of erection, from the design and under the superintendence of the author, in the city of Worcester, Mass., and designed for the residence of Benjamin Batman, Esq.

The Fig. No. 12 is a design adapted for a flower-garden.

No. 12.





CORINTHIAN ORDER.

Plate XIII.

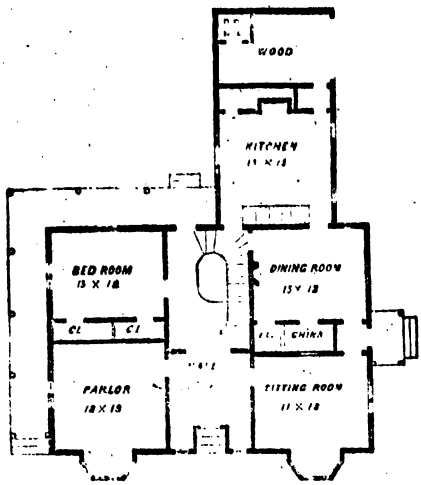
The Corinthian was the last order invented by the Greeks. It was seldom employed in their public edifices; and how often in their private buildings, it is not easy to determine. After the subjugation of Greece by the Romans, this order became a favorite with the latter, and its beauty greatly enhanced by an addition of new members, and a further embellishment of costly sculpture.

The fanciful story of Callimachus, which asserts that the acanthus gave origin to the ornament of the Corinthian capital, is too romantic to bear the test of criticism.

Fine examples of this order must be sought in Rome rather than in Greece. The portico and arch of Hadrian, at Athens, are not to be compared to the three columns of the Temple of Jupiter Stator; and the specimens of Grecian art, which have withstood the hand of time, give less satisfaction to the artist, than those beautiful and elegant structures which were the ornament of Rome.

On this plate is shown a Grecian example of the arch of Theseus, or Hadrian, at Athens.

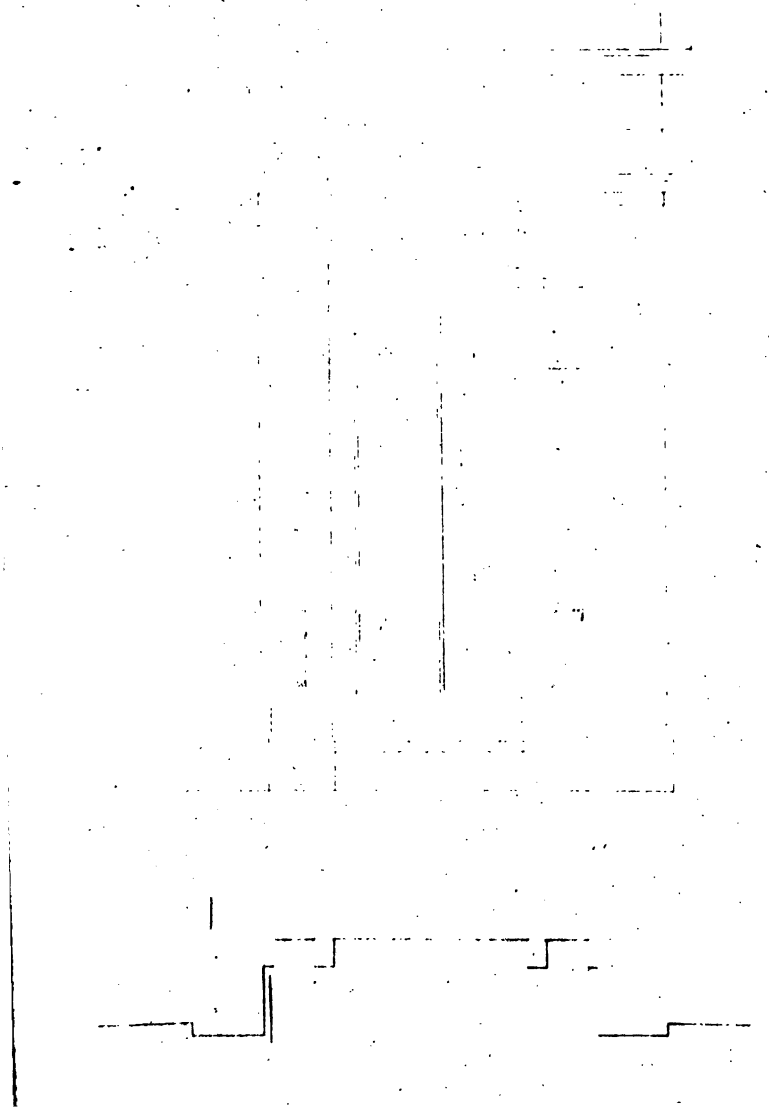
No. 13.



THE above shows the ground-plan of the foregoing elevation, No. 11. The construction of this villa, though simple, is somewhat peculiar. It is framed in the usual manner, with girts one foot eight inches between centres, and sheathed vertically. The sheathing does not exceed ten inches in width, and the joints are covered with battens two and one half inches in width and one and three eighths inches thick, with the two outer corners covered out. The corner-posts, middle girt-beams, and plates, also the rafters to the gables and beams, are furred out four inches, and the corners splayed, as will be perceived by examining the elevation. The rafters project three feet in a horizontal line from the plate, and are planed and covered. The roof-boards that cover the projection are planed and faced down. The principal story is ten feet in the clear; the chambers, nine feet in the clear; front hall, 14½ × 10½; rear hall, 14½ × 20½; parlor, 18 × 18; sitting-room, 15 × 18; bed-room, 15 × 18; kitchen, 15 × 18; china-closet, four feet six inches by six feet; wash-room, eighteen feet six inches by fourteen feet, with all the necessary closets, wood-room, &c.

Estimate the cost of this house to not vary much from $5000

PLT XIV.



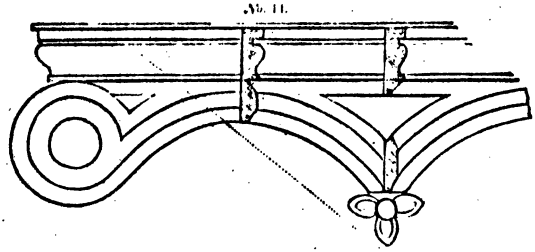
FRONTISPIECE.

Plate XIV.

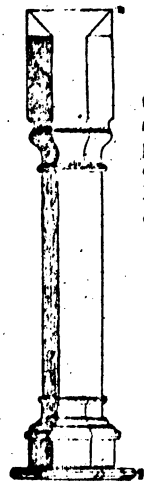
On this plate is given a design for a Frontispiece with a plan annexed, which is figured in feet and inches. This design, if executed according to the details, will present a fine appearance; and the carpenter need have no fears in carrying out this plan to the letter. The door is designed to have panes of glass inserted in the panels, which will produce a very pleasing effect.

No. 14 is an elevation of part of a verge-board, to a scale of one inch to one foot.

No. 14.

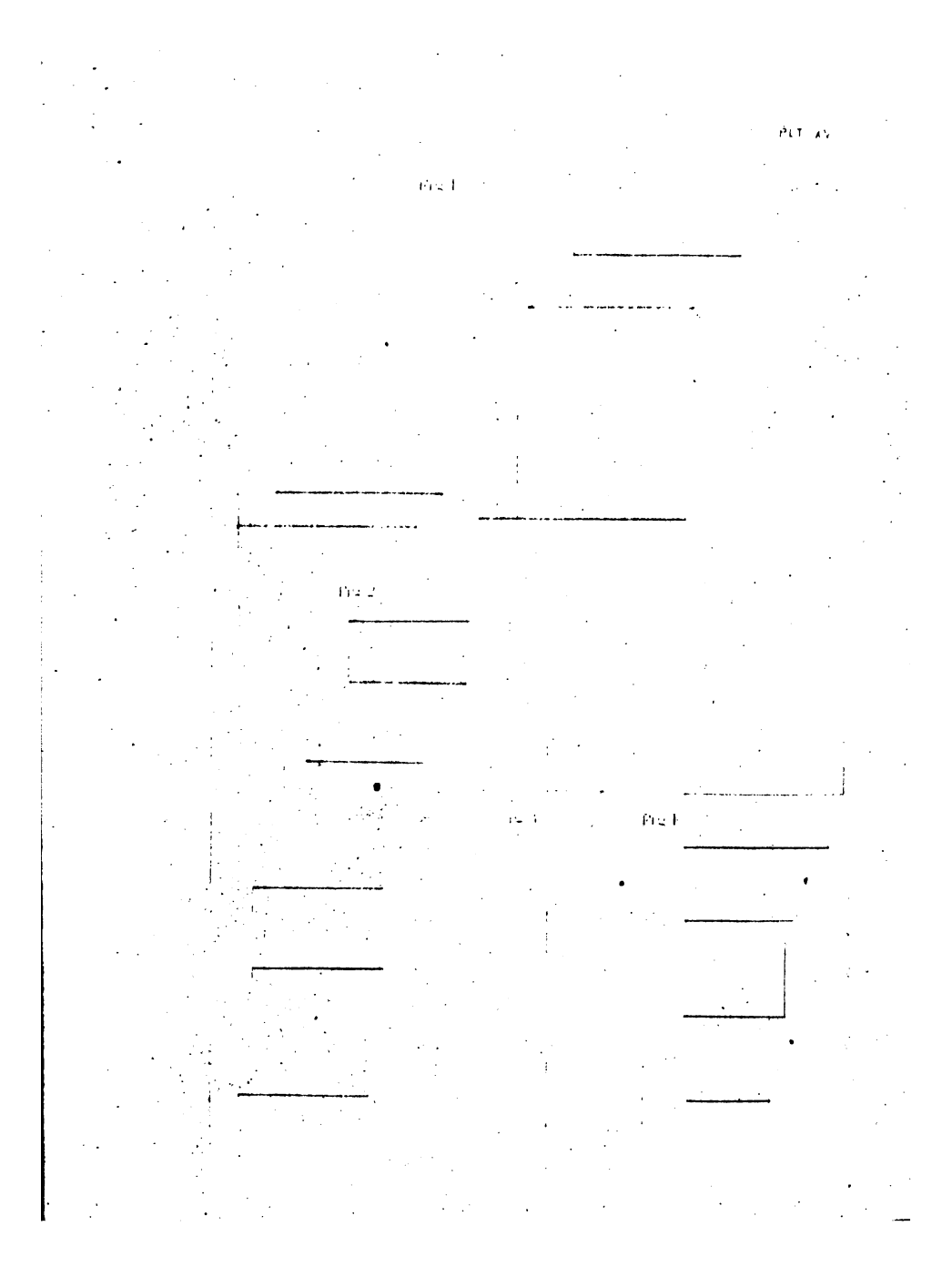


No. 15.



CHIMNEY-TOPS.

Every chimney, or stack of chimneys, to be truly architectural, should be treated as a column, or as a group or series of columns; and as every column consists of three parts,—a base, a shaft, and a capital,—so ought every chimney-top. An example of this is shown in Fig. No. 15. Every person that has a house designed for him should object to every chimney-top, whether Grecian or Gothic, that does not consist of an obvious base, shaft, and capital; and the base ought in general to be somewhat higher than the ridge of the roof. In general, all the upper terminations of the building should be bold and free; and this cannot be the case with chimney-shafts, unless they have a distinct base, a shaft of considerable length, and a capital consisting of several members, according to the style of architecture employed.

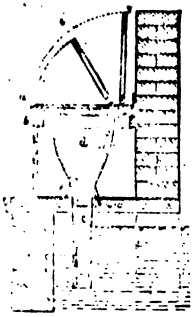


DETAILS OF FRONTISPIECE.

Plate XV.

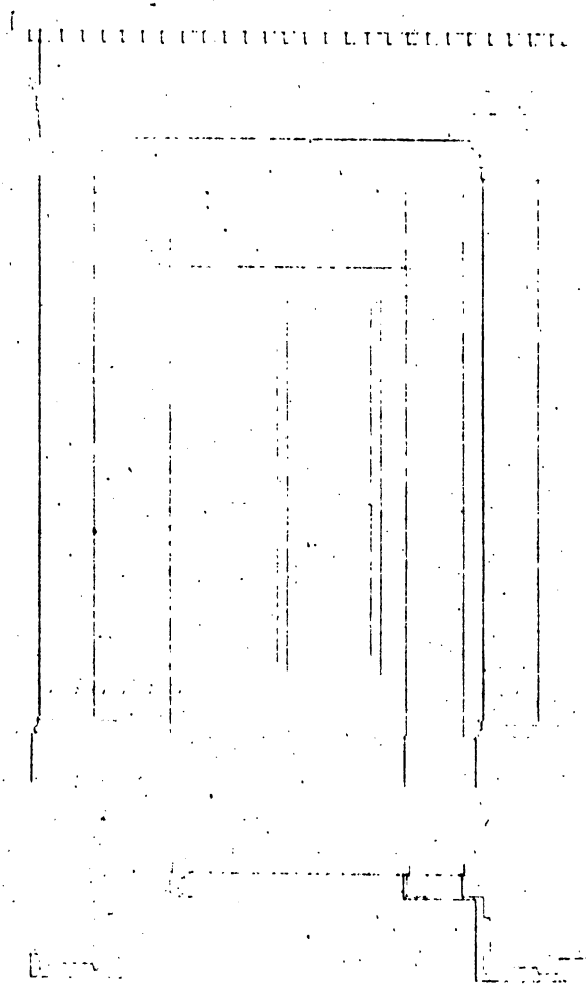
This plate gives the details of the Frontispiece, (Plate 14,) one half their real size. They will be readily understood by inspection of the Plate. *Fig.* 1, cornice. *Fig.* 2, capital. *Fig.* 3, the base. *Fig.* 4, lintel.

No. 16



CONSTRUCTING A COTTAGE PRIVY, IN CONNECTION WITH A CESS-POOL OR TANK FOR LIQUID MANURE.

The privy may be either partially or wholly over the tank, which should be closely covered, on a level with the privy floor, by a flag-stone, as shown in Fig. No. 16. In this figure, *a* represents the seat, which is hinged, in order that when the slops of the house are being thrown in, the seat may be lifted up to keep it from being wetted; *b* shows the fixed and permanent seat, on which the movable seat, *a*, rests; *c* shows the movable seat partially raised up; (*i*) the cover to the whole, raised up; *d* the basin of stone-ware, cemented at *f* into a tube, (*e*), also of stone-ware, or it may be of wood or metal; *g* is the surface of the water in the tank, higher than which it can never rise, in consequence of a waste drain; and it will only fall lower than the bottom of the tube, *e*, when the tank is nearly empty; *h*, *h*, the walls of the tank, and of the back of the privy.



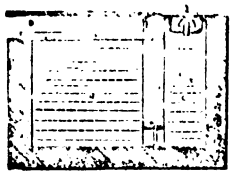
FRONTISPIECE.

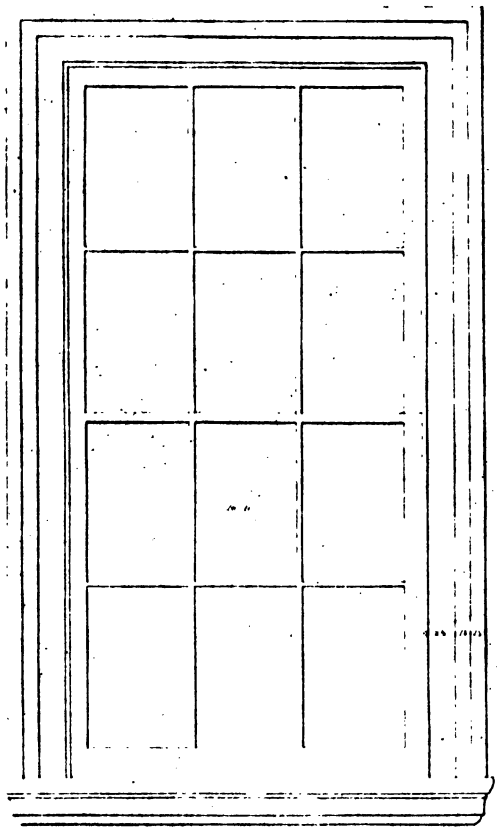
Plate XVI.

On this plate is given another example of a Frontispiece, which differs somewhat from the former, though not enough to require separate details. It is richer, and will, perhaps, produce a *more* pleasing effect than the first. At any rate, it will give a variety.

No. 17 is a section of the liquid-manure tank, supposed to form also the tank for the privy. In this figure, (*a*) represents the liquid, (*b*) a pierced slate or grating, through which the liquid filters into the well (*c*); (*d*) a bell-trap to admit of the drainings of the yard, and to prevent the risings of smells; and *e* the covering of flag-stone and earth. On a level with the surface of the water in the well, (*c*), there is an opening to a small waste drain, which, as it can only be entered by filtered liquid, cannot readily be choked up. The sides and bottom of the tank and well should be built in Roman cement.

No. 17.





WINDOW.

Plate XVII.

This plate shows the inside of a Window and its finish. It is designed for common practice; and, though simple, it is graceful in its proportions. On the right hand side is seen a section of the architrave, and the sizes of each member figured in inches.

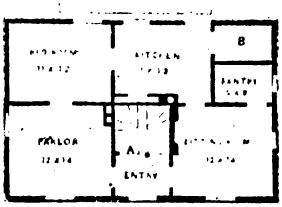
No. 18.

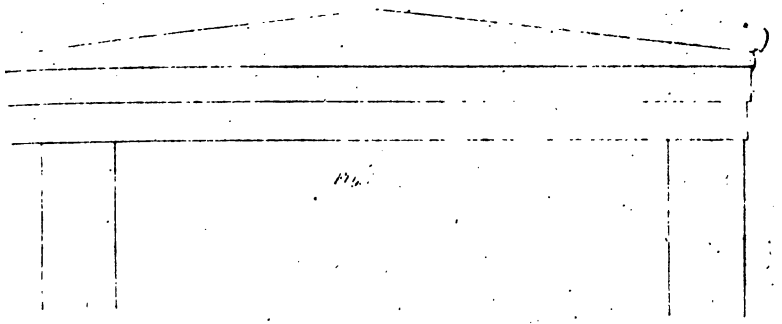
GARDENER'S COTTAGE.

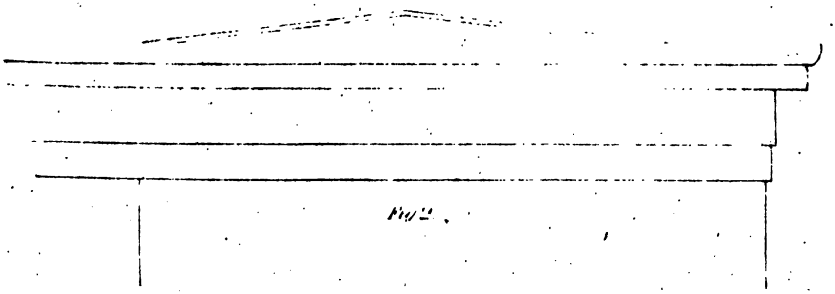
No. 18 presents the elevation of a design for a cottage, the interior of which would be found very convenient, and can be built at a moderate cost.

The ground-plan in No. 19 shows (A) entry, and stairs to upper floor; (B) wood-room; bed-room 11 × 12; kitchen 11 × 12, in which there is a closet; pantry, 5 × 8; parlor, 12 × 13; sitting-room, 12 × 14.

No. 19.







WINDOW CAPS.

Plate XVIII.

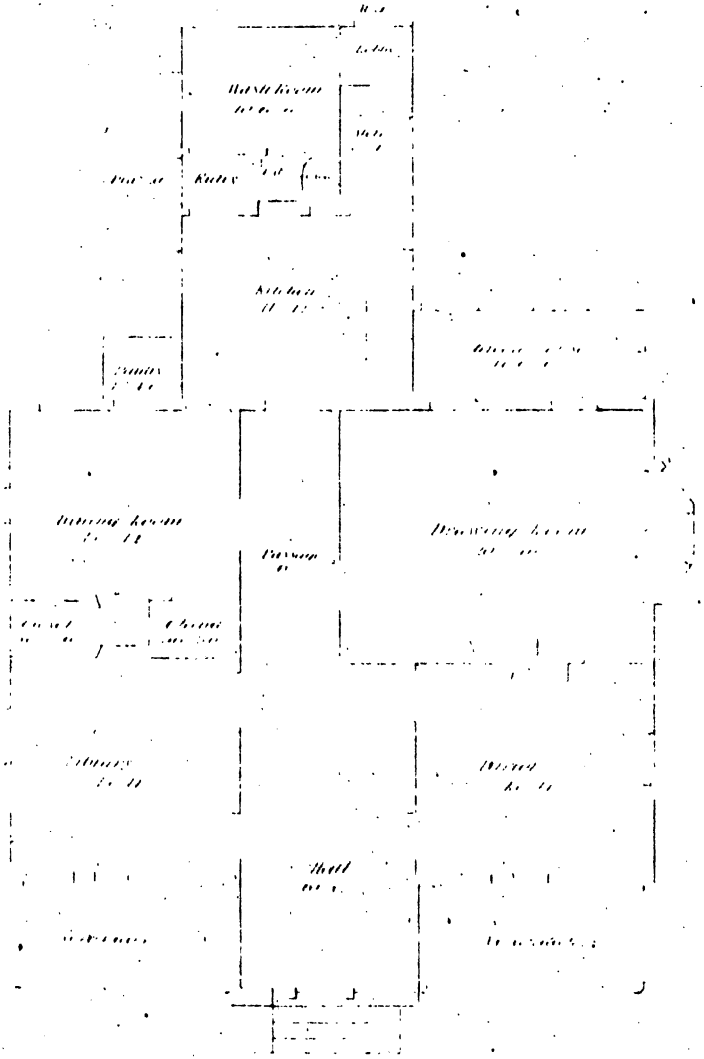
On this plate are represented two designs for external window finish.
Fig. 1 has no cornice, except a crowning moulding.
Fig. 2 has a small cornice and a pediment.

No. 20

MODERN VILLA

The elevation is represented in Fig. 20, and the ground-plan in No. 21, which shows an entrance-porch (*c*), hall (*b*), sitting-room (*e*), parlor (*d*), staircase, with closet under, (*i*), kitchen (*f*), water-closet (*g*), back entrance (*h*), pantry (*k*), wash-room (*n*), and wood-room (*l*).

The staircase is lighted from the tower, and there may be a borrowed light, either from the staircase or the passage to the water-closet, which, being completely within the house, is less likely to be injured during severe frosts.

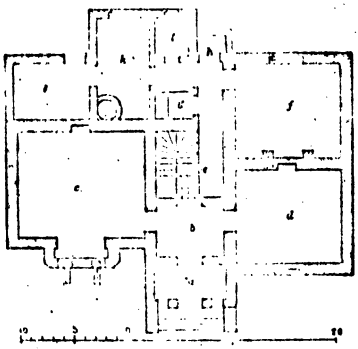


PLAN OF AN ITALIAN VILLA.

PLATE XIX.

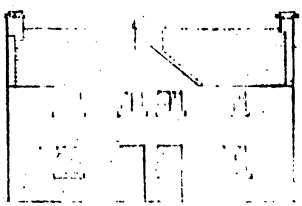
We here present a ground plan of a modern Italian Villa, with the front elevation and details in the succeeding plates. The only apology we have to offer, in giving three designs for dwelling houses in different styles of architecture, is, that there is, in almost all the works upon the subject, a want of adaptation of the various parts to particular places. This is a want that has been seriously felt, even among the more intelligent part of that class of industrious and useful artisans—the carpenters. The design here given, is rich in detail, and symmetrical in all its parts; it possesses every convenience usually found in this class of houses. We have not only labored to give expression of *form*, but a full expression of *design*, or *purpose*. And in the attempt we flatter ourself, that we have so far succeeded as to meet the wants of a class of gentlemen, whose means and republican principles will not admit of their erecting more classical or regal edifices.

No. 21.



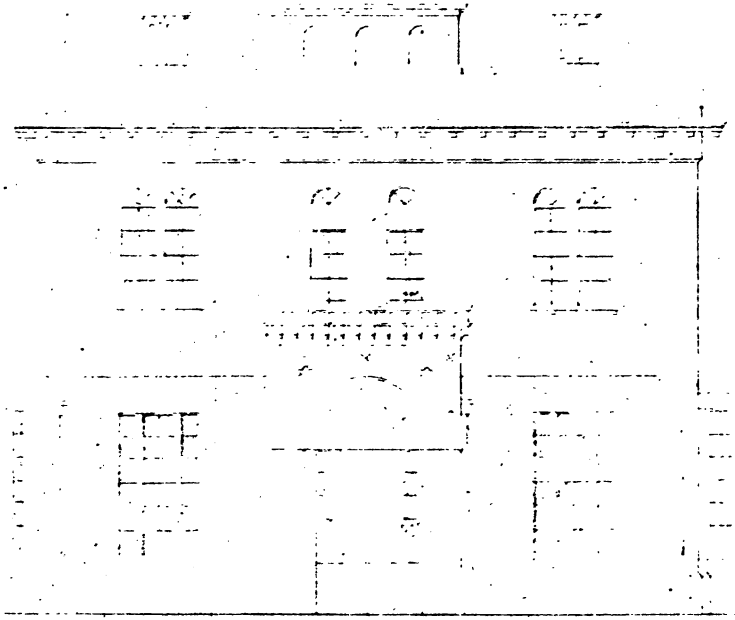
No. 22.

MODEL OF A CHEAP DOUBLE COTTAGE.



The front elevation, as seen in No. 22, exhibits two cottages in juxtaposition, which shows each as having a single family room, or kitchen, on the lower floor, and sleeping apartments above. The cottage, in place of containing one room below, may contain two.

The ground-plan, No. 23, shows (A) the front entrance, (B) kitchen, (*a*) recess for bed, (C) pantry, (c) oven, (D) closet, (F) stairs to upper floor, (*e*) closet, or cellar under the stairs.

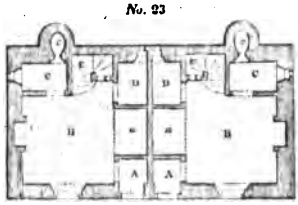


FRONT ELEVATION.

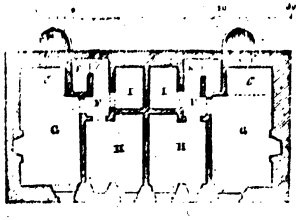
PLATE XX.

THIS plate represents the front elevation of an Italian Villa, which will be understood in connection with the details, &c. It is drawn to a scale of one eighth of an inch to a foot.

No. 23



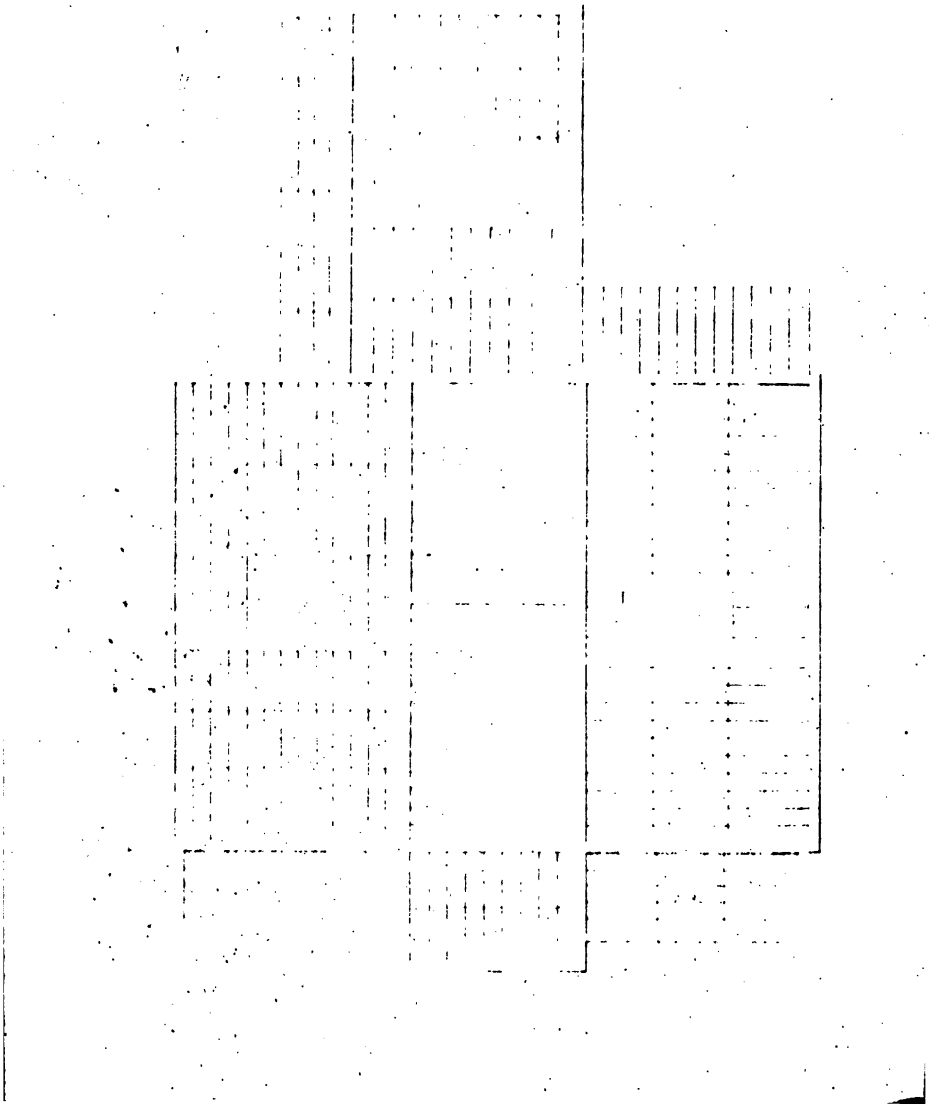
No. 24.



The upper floor of the foregoing plan is represented in No. 24. (f) the stair-landing, (*a*) bed-room, (*g*) recess for bed, (h) bed-room, (*i*) closet.

Fig. No. 25 represents a ground-plan, suitable for a moderate-sized farm-house. From the entrance and staircase, A, there is a kitchen, B, with wash-room, *c*, and pantry, D; parlor, F; sitting-room, E; store-room and cellar, *g*. The three small apartments, H, I, K, may be used as store-rooms for some of the smaller implements, or as a water-closet, work-shop, &c.

On the second floor there are three bed-rooms, one above the kitchen, and the others above the front rooms, with a dressing-closet over the entrance. The apartments on each side of the kitchen have lean-to roofs, and are not carried to the height of the other parts of the building.



FLOOR FRAMING.

Plate XXI.

This plate is designed to show a framing plan of the ground floor, for the Italian Villa. The timbers are all properly represented, and their sizes marked.

No. 26.

No. 26.

GOTHIC COTTAGE.

THE front elevation exhibits a perspective view of two fronts.

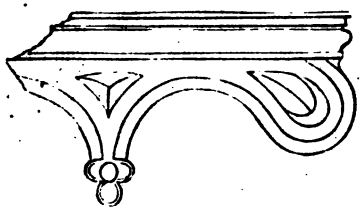
No. 27 represents an elevation of part of a verge-board, to a scale of one inch to one foot.

ELEVATION OF FRAME.

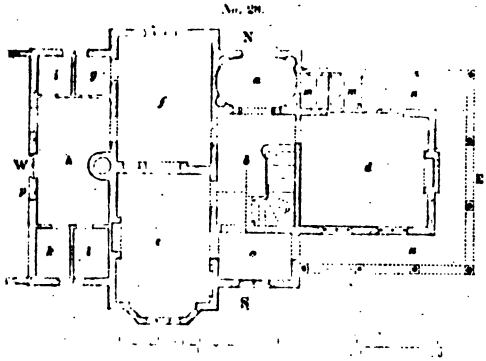
Plate XXII.

On this plate the front elevation of the framing is represented. The timbers here are marked, distances and heights given, &c.

No. 27



No. 28.



THE No. 28 shows the ground-plan, in which *(a)* is the principal entrance porch, which is to be finished with a covered roof, and to have Gothic niches in the angles for statues, or vases for flowers.

From this we pass to the hall and staircase, (*b*), by a Venetian door, the upper part of which may be glazed with stained glass; thence to a small ante-room, (*c*), which, if having a good southern exposure, may be used as a conservatory for plants; from which there is a door to the covered piazza, (*n*). From the hall we enter the sitting-room, (*d*), the two windows of which may be brought down to the floor, and open like French casements, so as to admit of easy access to the piazza, when the ante-room is occupied.

DETAILS OF CORNICE.

Plate XXIII.

Fig. 1.—A representation of the cornice, &c.

It will be understood by examination. Drawn to a scale of 2 in. to a foot.

Fig. 2.—A triangular window seen in the front elevation. Scale, 1 in. to a foot.

Fig. 3.—An ornament, shown in the elevation near the triangular window; half size.

From the hall we also enter the parlor, (*e*), which has a door to the anteroom, or conservatory; also to the kitchen, (*f*).

If preferred, (*d*) may be made the parlor, and (*e*) the dining-room, and then a communication may be made with the kitchen, (*f*).

The kitchen door from the hall is finished on the staircase side in the same manner as the doors of the principal rooms. From the kitchen there is a coal-closet, (*g*), back kitchen or wash-room, with a copper, (*h*), closet, (*k*), pantry, (*l*), and a store-closet, (*i*).

There are, if desired, two water-closets, (*m, m*), both under cover, — one entering from the porch, the other from the piazza.

Under the principal stairs is a flight of steps, (*o*), shut in by a door, descending to the cellar. Behind the wash-room, at (*p*), may be a yard, surrounded by a high fence, and covered with shrubbery, where may be the wood-house, privy, well, &c. &c.

No. 29

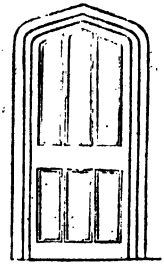
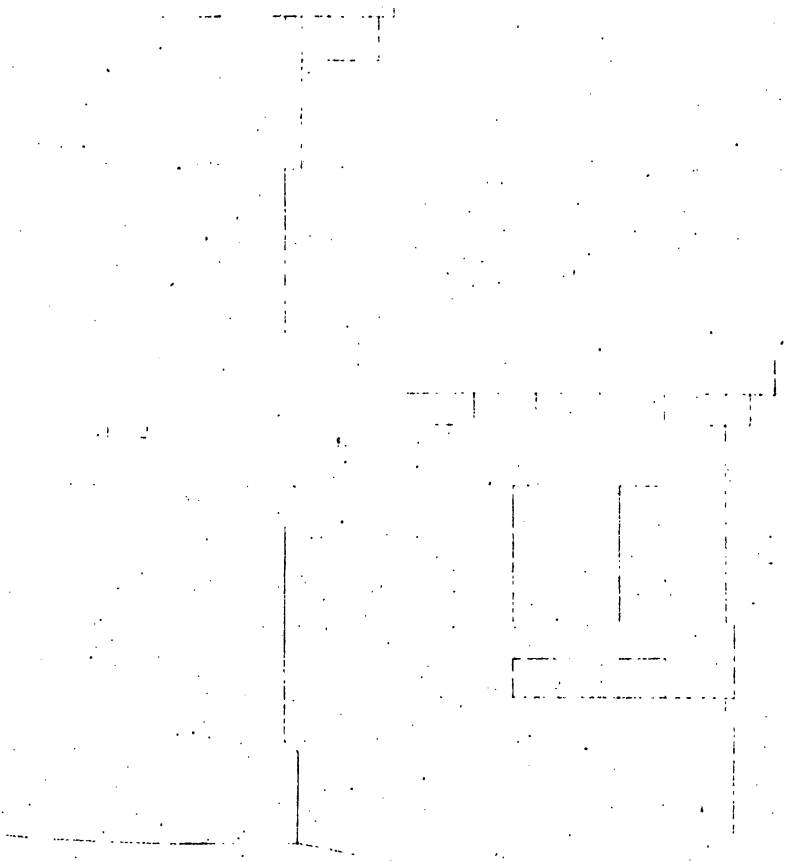


Fig. No. 29 shows an elevation of a door; it is surrounded on one side by splayed bricks, and is six feet high to the springing of the arch.

Fig. No. 30 shows an elevation of chimney-shafts, the base and cap of which are of stone, and the shaft and plinth rising from the roof of brickwork, or artificial stone,— the diameter of the flues nine inches.

No. 31 is a plan of the above elevation.

No. 32 is also a plan of the above elevation.

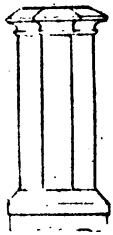


DETAILS.

Plate XXIV.

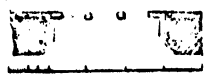
This plate represents a design for a chimney, with a scale annexed. 1, 2, 3, 4, are openings for smoke. Also, a design for the external finish of the cupola. *Fig.* 1, chimney. *Fig.* 2, cupola.

No. 30.



No. 31.

No. 32.

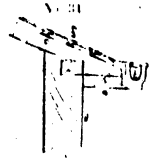


WOODEN EAVES-TROUGH, FOR COTTAGE ROOFS.

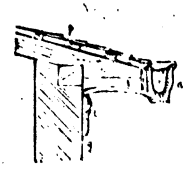
This finish to the eaves of a roof has now become very general for country-houses; and deservedly so, being the neatest, cheapest, and most durable of any, and adapted to the humblest cottage as well as to the elegant villa. This is made of the best clean, seasoned timber, with as few joints as possible, with mitred joints at the angles. It is fixed perfectly level, the fall being within itself, which is obtained by hollowing out the middle, beginning at (*a*, *c*), in No. 33, the highest part of the fall, and proceeding gradually deeper to (*z*), the lowest; thus a trough of this description may be fixed along a front of forty or fifty feet in length, the fall being given from the centre to the right and left. It requires no lining, but a good thorough painting, which should be repeated every three or four years. A large moulding being wrought on the front, it is thus made to represent the crowning member of a cornice.

No. 33

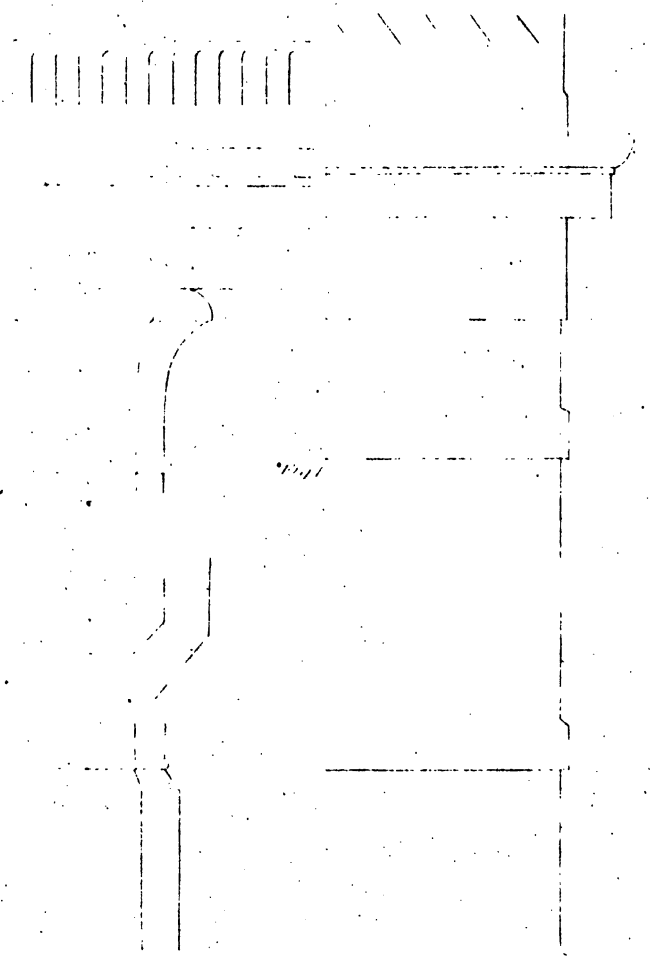
No. 34



No.



No. 34 represents the application of it to a cottage, where (*a*) is the moulded front of the eaves-trough, (*b*) the hollow, (*c*) the plastered soffit, (*d*) bearer, (*e*) rafter, (*f*) slating, (*g*) front wall of house, (*h*) fascia, (*o*) wall-plate.



DETAILS OF PORTICO AND ORIEL WINDOW.

Plate XXV.

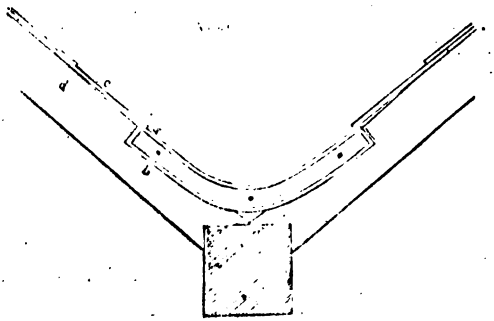
On this plate are two designs, which will be readily understood without any explanation.

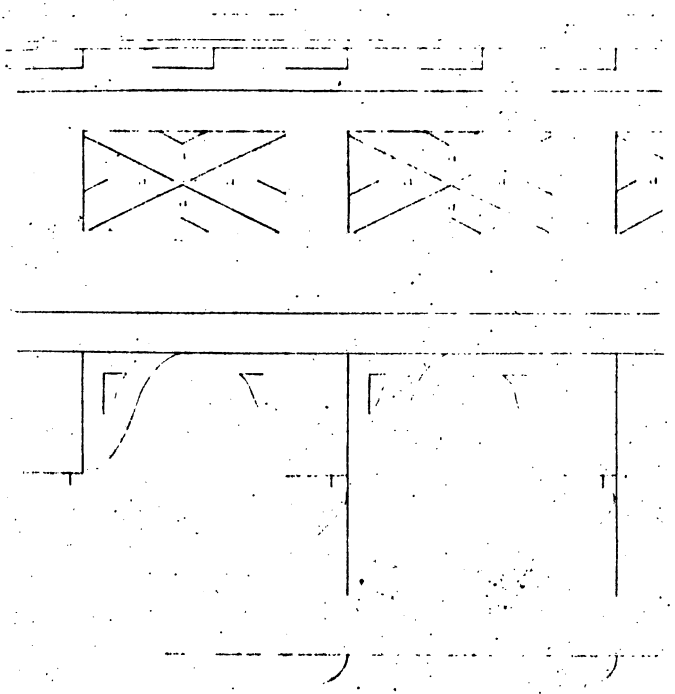
Fig. 1, Oriel Window. *Fig.* 2, Portico.

No. 35, the same, with a higher style of finish. The same letters of reference answer. In addition, (*i*) shows a lead moulding and fascia in cement, and the plancier, (*c*), is curved. It may be finished in a still more elaborate style, with dentils or cantilevers, if required.

CAST-IRON GUTTERS TO ROOFS,

As a substitute for leaden ones, are found economical and effective. No. 36 represent a section of a gutter between two roofs, in which (*a, a*) shows the gutter, with a flange, (*b, b*), for joining the different pieces together. (*c, c*) the slates; (*d, d*) the rafters; and (*e*) the gutter rafter. All the care that this requires, in slating or shingling, is, to bring the upper edge of the lower course of slates or shingles to a level.





DETAILS.

Plate XXVI.

This is a representation of the ornamental parapet-railing, over the porch of the front entrance. Scale, 2 inches to a foot; *a*, *a*, *a*, *a*, are openings.

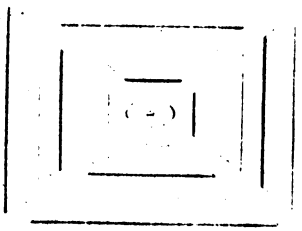
No. 37.

THE TUDOR STYLE.

The above elevation represents a cottage in the Tudor style, which fashion of architecture, so prevalent in the time of the Tudors, and called by that name, has been revived, to considerable extent, in cottage building, with very pleasing effect.

No. 38 represents the ground-plan for a flower-garden.

No. 38.



DETAILS OF DOOR AND WINDOW.

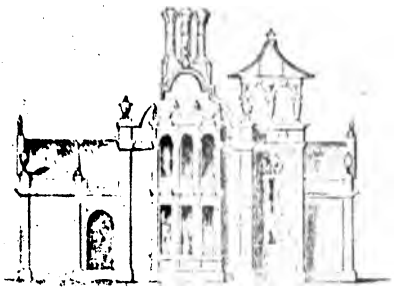
Plate XXVII.

This plate will be understood by measurement, and reference to the figures.

Fig. 1. *a*, stud; *b*, window weight; *c*, section of window-sash; *d*, architrave; *e*, plastering; *f*, sheathing.

Fig. 2, is a section of an inside door and its finish; *a*, the architrave; *b*, jamb; *c*, door-stile; *d*, panel; *e e*, stud; *h*, plastering; and *i*, ground

No. 39.

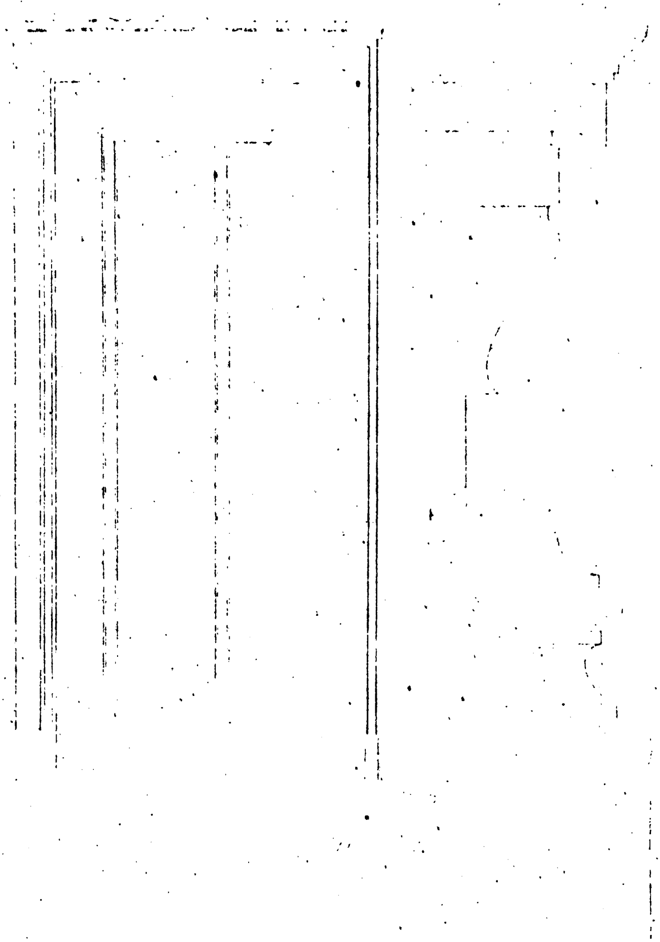


A COTTAGE IN THE ELIZABETHAN STYLE,

Is shown in the elevation No. 39.

The ground-plan, No. 40, shows a porch (*a*), hall (*b*), sitting-room (*c*), staircase (*d*), parlor (*e*), kitchen (*f*), bed-room (*g*), china closet (*h*), back entrance (*i*).

No. 40.



DETAILS OF DOOR AND FINISH.

Plate XXVIII.

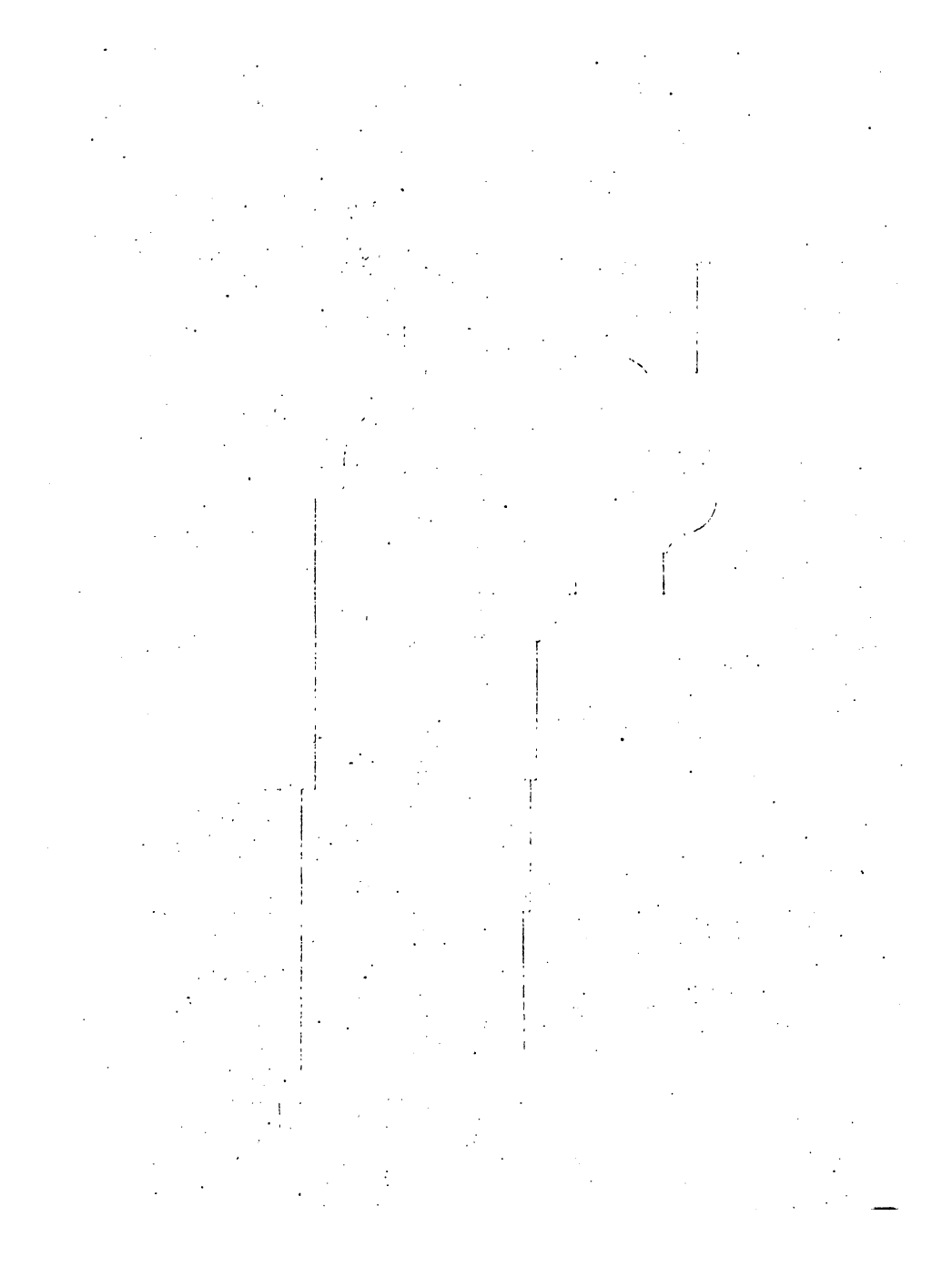
A, an elevation of an inside door, with its finish and scroll ornament over the top. *B*, cornice and architrave, half size; *C*, cut bead to ornament the architrave; *D*, base, half size.

No. II

VILLA IN THE ITALIAN STYLE

This beautiful villa, the residence of Thomas A. Clark, Esq., of Worcester, Mass., has just been completed, from the designs and under the superintendence of the author.

This building is very much admired for chasteness and beauty, as well as its convenience. It is built of wood, with the roof covered with tin. The principal story is eleven feet in the clear; the chambers, ten feet in the clear. parlor, twenty-three feet six inches by fifteen feet, with the ceiling panelled, and moulded with an enriched moulding, with two beautiful centre-pieces; hall, twenty-three feet six inches by eight, with front stairs leading to the second story; sitting-room, fifteen feet by fifteen; dining-room, fifteen feet by fifteen feet; kitchen, fifteen feet six inches by thirteen feet six inches; pantry, nine by eight feet; china closet, nine by five feet; wash-room, ten by fourteen feet; wood-room, ten by eight feet. The kitchen is fitted up with cooking-ranges; marble mantels in parlor, sitting and dining rooms; and a [illegible] furnace in the cellar, for heating the house. All the doors [illegible] black-walnut. Estimate the cost of this house to not [illegible]



STUCCO CORNICES.

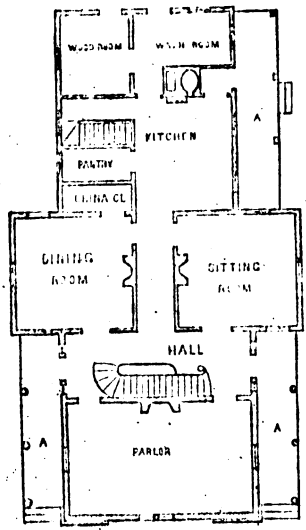
PLATE XXIX.

ON this plate are two designs for stucco cornices.

Fig. 1, is designed for the drawing-room and hall; half the real size.

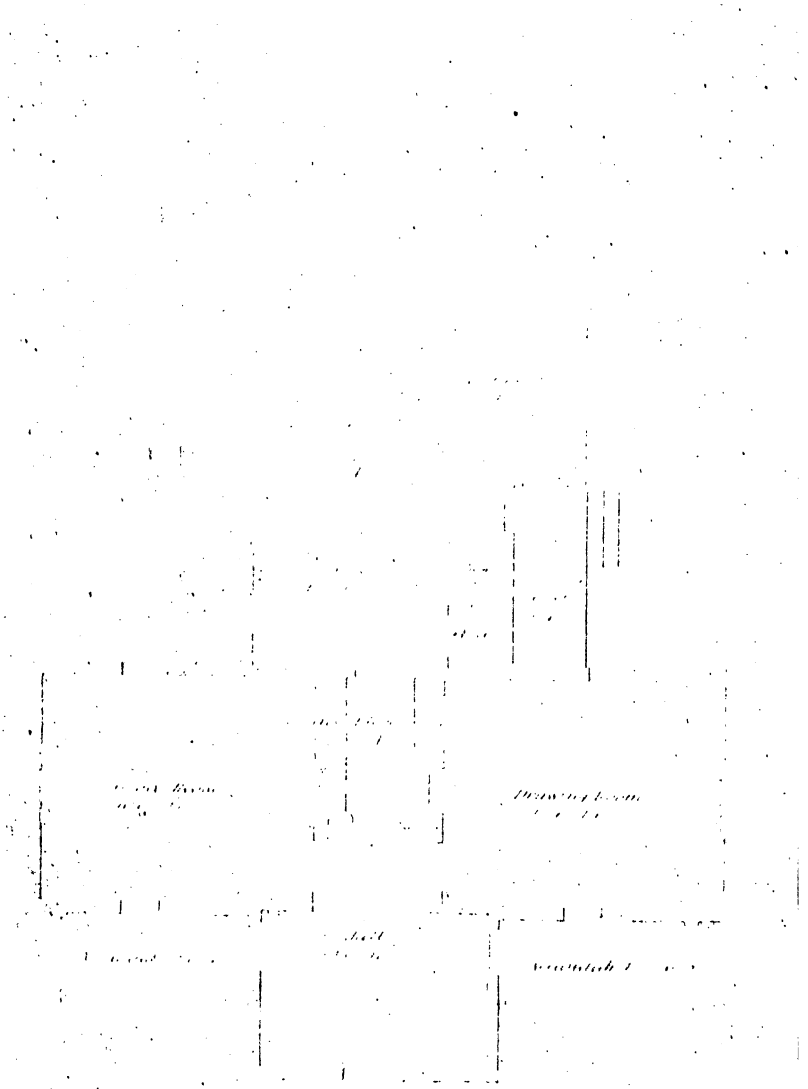
Fig. 2, is designed for the parlor, library, and dining-room; one *quarter* the real size.

No. 42.



No. 42 shows the ground-plan to the front elevation, No. 41.
No. 43 represents an elegant design for an arbor.

No. 43.



PLAN OF A COTTAGE HOUSE.

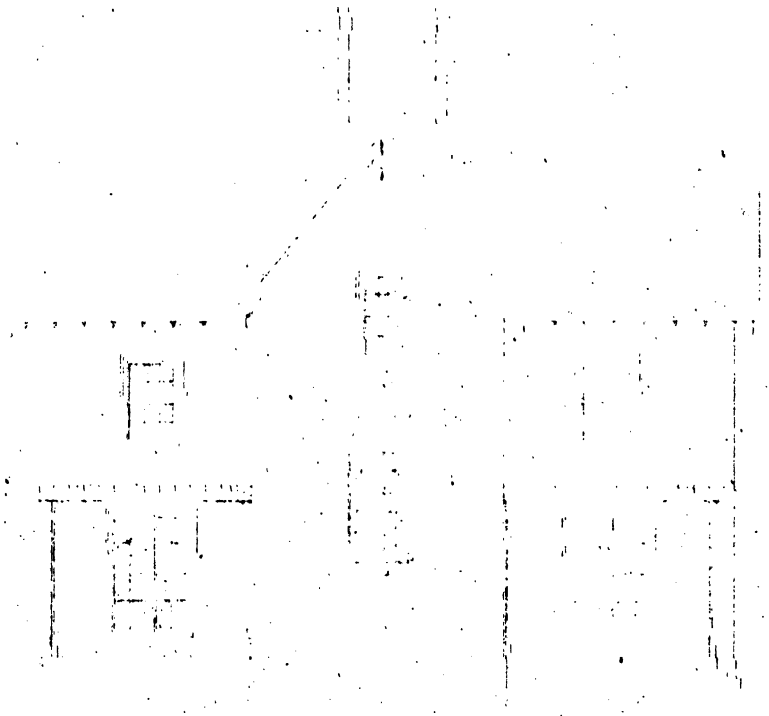
Plate XXX.

This plate represents the ground plan of a house in the cottage style. The back part, as far as the dining-room extends, is to be two stories high. The rest, or kitchen and wood-room, one story high; the cornice of which is to continue over the porches on each side of the dining-room. The front entrance is from the veranda on each side of the hall, as will be perceived.

No II.

GOTHIC VILLA

The elevation is shown in the above. The intention of this design is to show an ornamental style of architecture, which may be executed in a substantial manner at comparatively small cost.

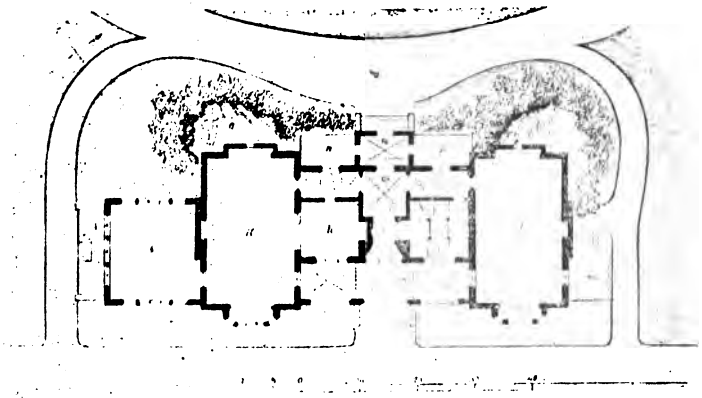


FRONT ELEVATION

Plate XXXI.

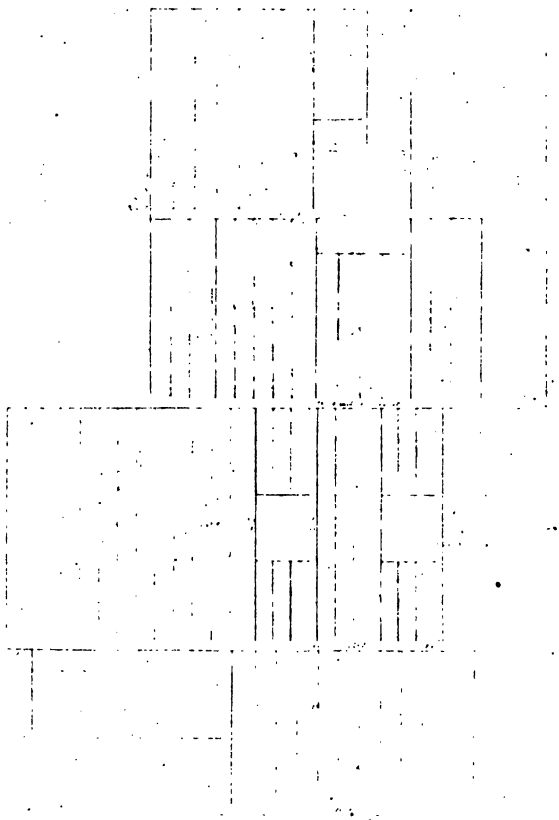
We here present the front elevation of a cottage house, drawn to a scale of one eighth of an inch to a foot. In all the designs the same scale is used, unless otherwise shown.

No. 45.



No. 45 represents the ground-plan to the preceding elevation. (*a*) is the porch, (*b*) the hall, (*c*, *c*) corridor, (*d*) lobby to the staircase, (*e*) staircase, (*f*) sitting-room, (*g*) parlor, (*h*) library, (*i*) conservatory, (*k*) arcade, (*l*) landing and steps down to the grounds, (*m*) landing, or terrace, and steps to the grounds from the conservatory, (*n*, *n*) areas, (*o*, *o*) sunk or sloped ground to give light and ventilation to the basement, and (*p*) approach road.

To the entrance of every house a porch is not only a luxury, but is necessary to protect the house from cold, and to form a suitable shelter in inclement weather. The entrance archway of this porch, (*a*), should be the largest opening in this front, and it should be conspicuously decorated, in order that it may at once mark the principal entrance.



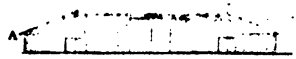
FRAMING.

PLATE XXXII.

REPRESENTS the first-floor framing. This needs no particular explanation. The sizes of the timbers are marked, &c.

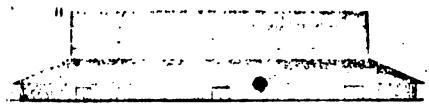
BUEL'S BARN.

No. 46.



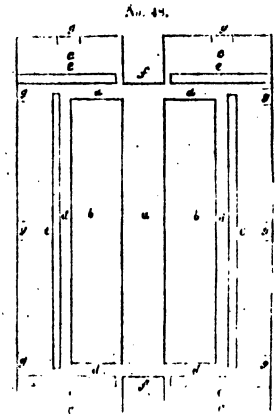
No. 46 (A) represents the end view

No. 47

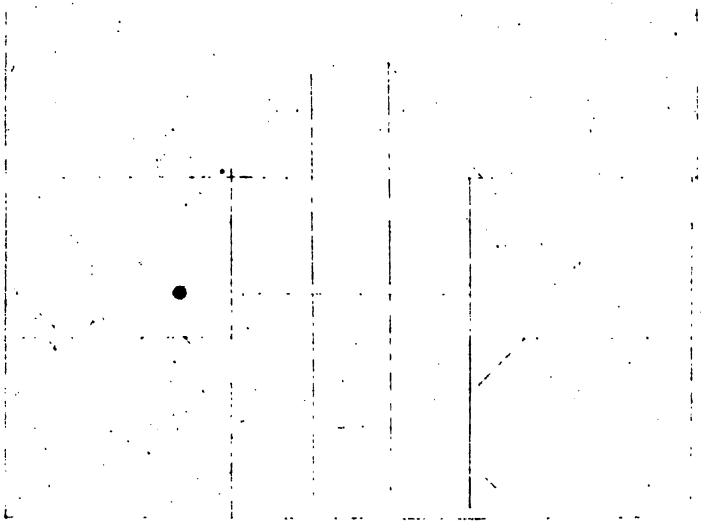


No. 47 (B) shows a side view.

No. 48.



No. 48 is the ground-plan of a barn according to Buel's views. (*a*) is the barn floor, fourteen feet wide; (*b*, *b*) bays for hay and grain, eighteen feet



ELEVATION OF FRAME.

Plate XXXIII.

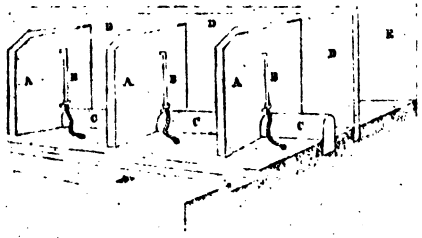
By this plate is represented the elevation of frame for the cottage house. The front entry or hall to be arched, as shown at *a*, *a*, *a*.

The heights, openings, and sizes of timbers, are marked in feet and inches.

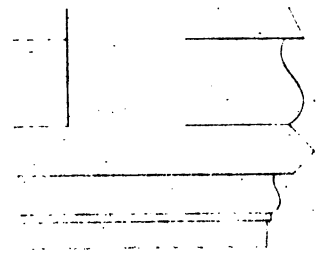
wide and ninety-two feet long; (*c*, *c*) stables for cattle and horses, thirteen feet wide in the clear; (*d*, *d*) passages to stable, four feet wide; (*e*, *e*) mangers for feeding, two and one half feet wide; (*f*, *f*) great doors, fourteen feet wide; (*g*, *g*) stable doors, five feet wide, double. Length of barn, one hundred feet; width, fifty feet; posts, eighteen feet; pitch of roof, twelve and one half feet; height of lean-to posts, seven feet; pitch of stable roof, eight feet; length of side lean-tos, one hundred feet; length of end lean-tos, thirty-eight feet. The barn is framed as if to stand alone, omitting the lower girt at the ends on each side of the large doors. The lean-tos are then framed on to the barn in the simplest manner, the passage being round the main body of the barn, excepting at the ends, where the passage is in the main barn, and the lean-tos there are only sixteen feet wide, and the manger is fitted up to the main barn. Only one passage is made to go into the shut stables at the ends. Stalls are made, seven and one half feet wide, and boarded between, and each ox or cow is tied next to the partition side of the stall, which prevents their getting together, and saves room.

This barn will hold two hundred tons of hay. Granaries can be partitioned off from the bays or stables, as may be convenient. On this model barns of any size may be built.

No. 49.



No. 49 shows a plan for the internal arrangement of cattle-sheds, &c., a movable ring and chain being used for confining the animals. A, A, A, partitions between the animals; B, B, B, the upright iron rods or posts to which are fixed the rings and chains; C, C, C, the raised edges of the manger in front; D, D, D, the partition; E, the passage in front; and F, that behind the animals.



DETAILS.

Plate XXXIV.

On this plate are shown two designs for outside finish.

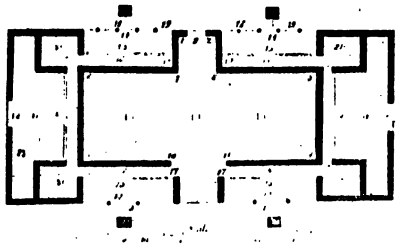
Fig. 1.—Cornice and battlement of the portico.

Fig. 2.—Main cornice, &c.

A, an ornament which covers the ends of the bracket, as seen in the front elevation.

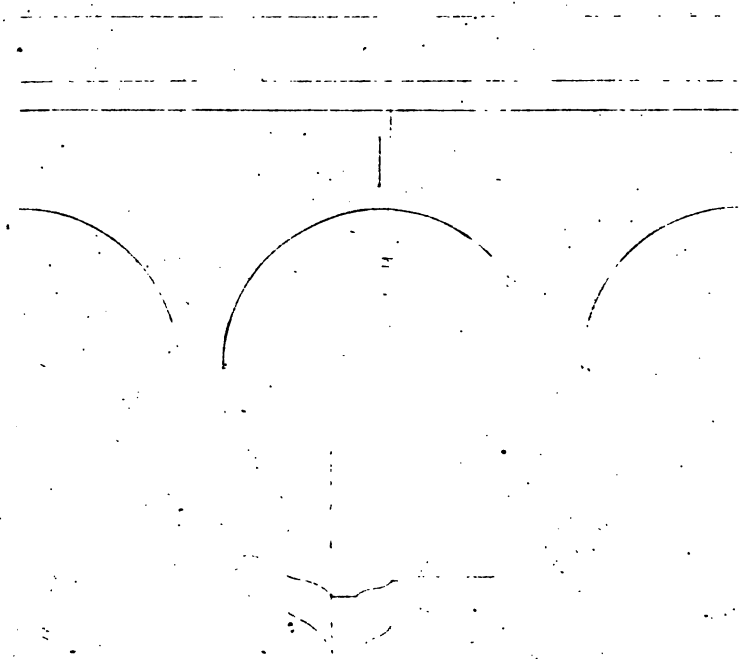
No. 50.

MODEL OF THE WASHINGTON BARN.



The above is a plan of the barn structure sketched by Arthur Young for General Washington.

Figures 1, 2, 3, 4, 5, 6, represent the barn; 1, 2, 7, 8, the porch of do., with a small door at 9; 10, 11, the great doors; 12, the floor, which extends the space of 1, 2, 10, 11; 13, 13, bays; 14, 14, 14, 14, sheds; 15, 15, 15, 15, mangers; 16, 16, 16, 16, passages, between two and three feet wide; 17, 17, 17, 17, doors into the passage; 18, 18, 18, 18, principal posts on which the sheds rest; 19, 19, 19, 19, gutters of bricks sloped for conveying the urine of the cattle to 20, 20, 20, 20, cisterns; 21, 21, 21, 21, sheds for various purposes; 22, 22, two yards, with each a shed for shelter; 23, 23, enclosure; 1, 2, 8, 3, 4, 5, 6, 7, the main body of the barn, which rises from fourteen to twenty feet to the eaves, all the rest of the shed being placed against it.



DETAILS.

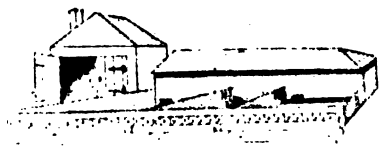
Plate XXXV.

Fig. 1.—The pendant in the angle of the roof or pediment.

Fig. 2.—Section of the same.

Fig. 3.—Ornamented barge-board. From *A* to *B*, a section of the cornice and barge.

No. 51.

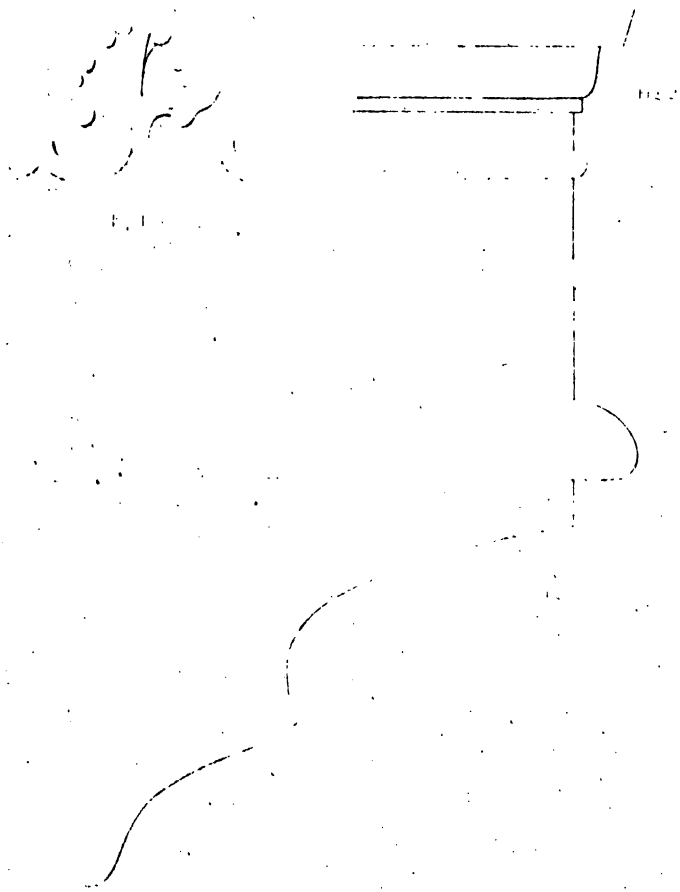


No. 51 gives a representation of a piggery, which should be raised upon a little declination, so as to allow the drainage of the urine, and divided into sties of between six and seven feet in width and fourteen or fifteen feet long, the back part of which should be covered with a low roof, and sufficiently large to allow a fatting hog to lie down conveniently. The uncovered part, which is used as a court for the animal to feed in, &c., should be boarded in front by a low paling, so as to admit of sun and air, and the trough placed in one corner. The building may be extended to any length, and if connected at one end with a boiling-house, and at the other with a cess-pool, into which the drains are emptied, the elevation of the whole will present the appearance as indicated in No. 51.

No. 52.

No. 52 shows an apartment for boiling or steaming food, apparatus necessary, and mode of proceeding. Any kind of wooden box or barrel will answer for this purpose. The steam is to be conveyed in a pipe to the lower part of the vessel, which should have a sliding board at the bottom.

The apparatus consists of a furnace and iron boiler, A, furnished with a safety-valve. It is supplied from a cistern, C, placed at the height of five or



DETAILS.

Plate XXXVI.

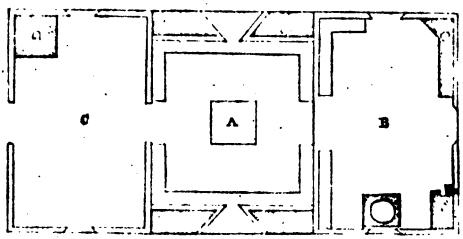
Fig. 1.—The ornament surmounting the cornice of the Oriel window seen in the front elevation, half size.

Fig. 2.—The cornice of the Oriel window.

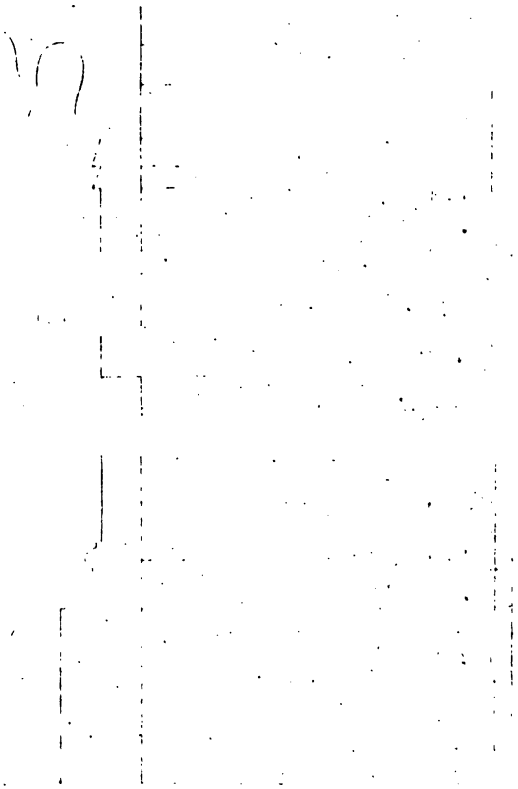
Fig. 3.—The pedestal or base of the same.

six feet above it. When filled, the boiler regulates its supply of water by means of a float inside, attached to the valve in the cistern. Two casks, c and D, are intended to hold the potatoes, or other matter to be steamed;—the steam being conducted to these, from the boiler, by a pipe branching off to each by stop-cocks.

No. 53.



No. 53, as above, represents a plan for a dairy-house, the roof of which should be of a high conical form, or span roof, rising from the centre, and projecting downwards broadly over the sides, to shade the body of the house. (A) represents the milk-room, with broad shelves around the sides, and in the middle a table for preparing the butter. The windows are closed with lattices covered with gauze wire. (B) the churning-room, with boiler in one corner, and, on sides, frames for cheese-presses, and vessels for holding the whey, and pipes for conveying it to a cistern outside. (C) the wash-house, for cleansing and care of the utensils; it therefore contains a furnace, with a cauldron for scalding the vessels, and a pump, communicating with a well. The outer door, or entrance, is here; and adjoining are placed stands, under the verandah formed by the projection of the roof, for exposing the wooden implements which may have been washed to be dried.



DETAILS.

PLATE XXXVII.

Fig. 1.—Column of the portico in front. *A*, bracketed capital; *B*, a section of the column; *C*, base.

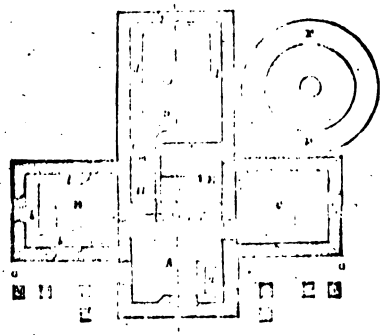
Figs. 2 and 3, are two examples of hoods for outside finishing of windows. (See elevation.)

No. 54.

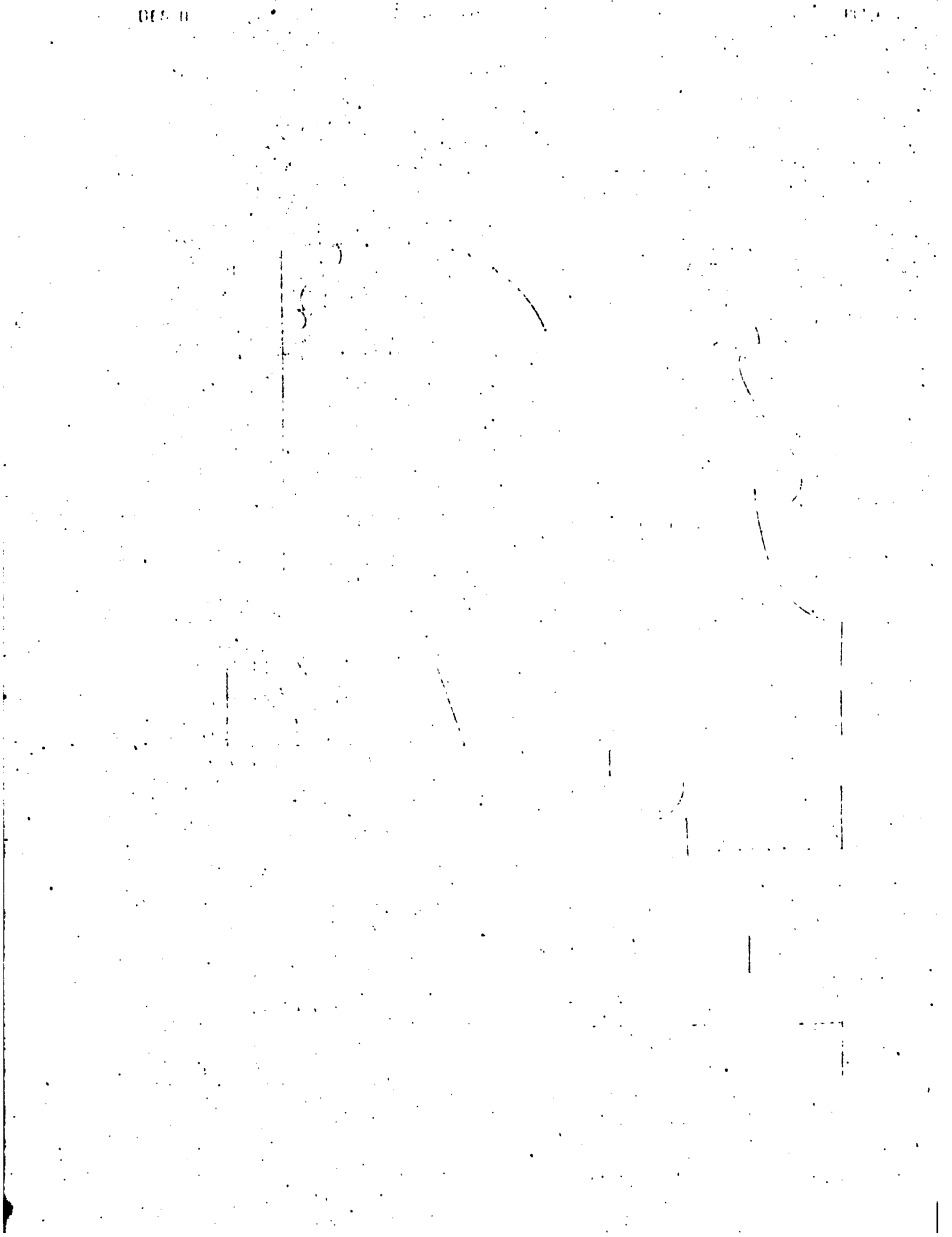
MODEL OF A COMPLETE DAIRY.

THE above front elevation represents a view of a complete dairy, which may form a part of the farmer's house, or be distinct from it.

No. 55.



The ground-plan is shown in No. 55. (*x*) is the kitchen; (*a*), steam boiler; (*o*), sink in the window recess, in which the water can be heated by a steam pipe from the boiler; (*s*), small sink, communicating with the pigs' troughs, in which the whey and other refuse are thrown; (*r*, *r*), stone benches; (*t*), wood and coal cellar, with hatch, (*e*), by which the fuel is



DETAILS.

PLATE XXXVIII.

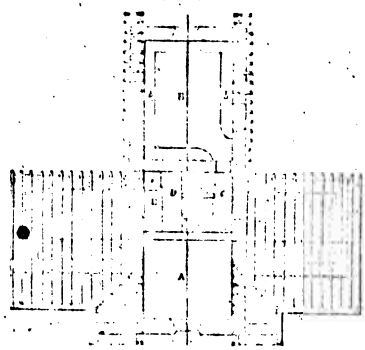
Fig. 1.—Stucco cornice, half the real size.
Figs. 2 and 3.—Plans of architraves.
Fig. 4.—Base moulding.
Figs. 2, 3 and 4, are of full size.

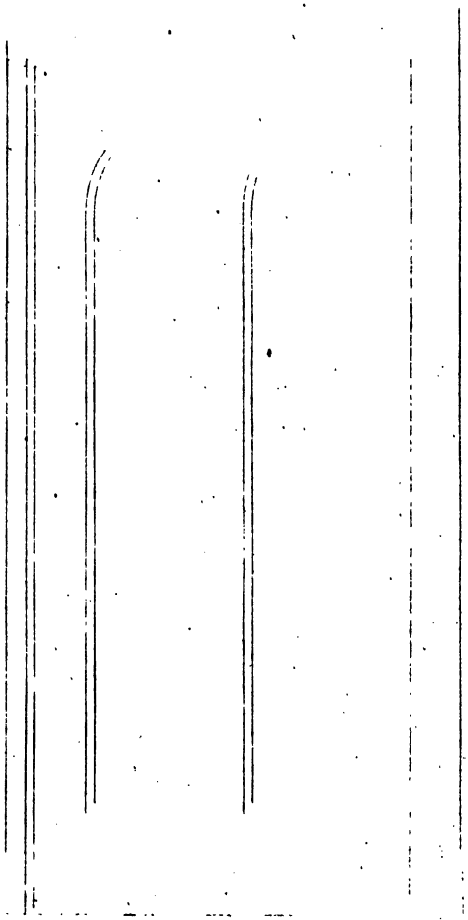
thrown in; (c), churning-room; (e), stone bench for milk-vessels; (B), cheese-making room; (*b*, *b*, *b*), stone bench for utensils, (D), milk-room; (*d*, *d*), stone bench round the room, for milk-vessels; (*f*), table for preparing butter, with basin and fountain; (*g*, *g*), shed along the front of the building; (F, F), horse course for moving the churn; (H), passage; (*m*), stairs down to milk-room; (I), stairs to the upper part.

No. 56.

No. 56 shows a side elevation of the foregoing No. 54. In plan of the upper floor, represented in No. 57, (A) is the store-room; (B), store-room; (*b*, *b*), shelves; (C), landing of stairs; (D), upper landing; (E), cistern; (*e*), closet.

No. 57.





INSIDE DOOR.

PLATE XXXIX.

THIS plate shows an elevation of an inside door and finish, showing a section through the centre.

No. 58.

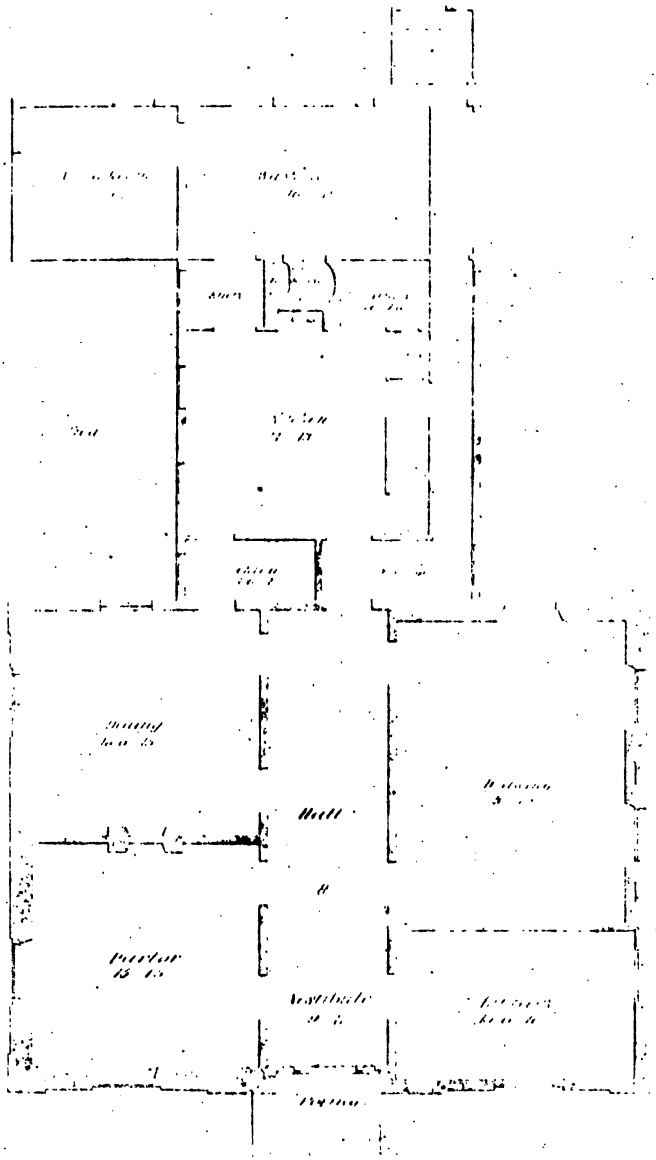
The above is a partial view of a beautiful cottage built for Wm. B. Lang, Esq., on the Highlands in Roxbury.

No. 59.

This is a view of a noble villa erected at Wyoming, on the borders of Spot Pond, near Medford, and late the residence of Wm. B. Lang, Esq.

No. 60.

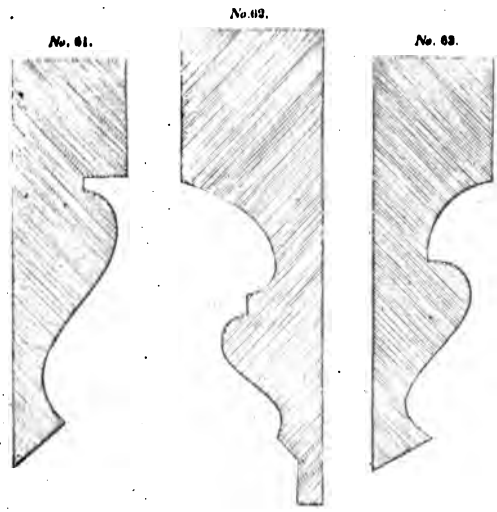
The above is a plan of a castellated house.


Hall
Parlour
Vestibule

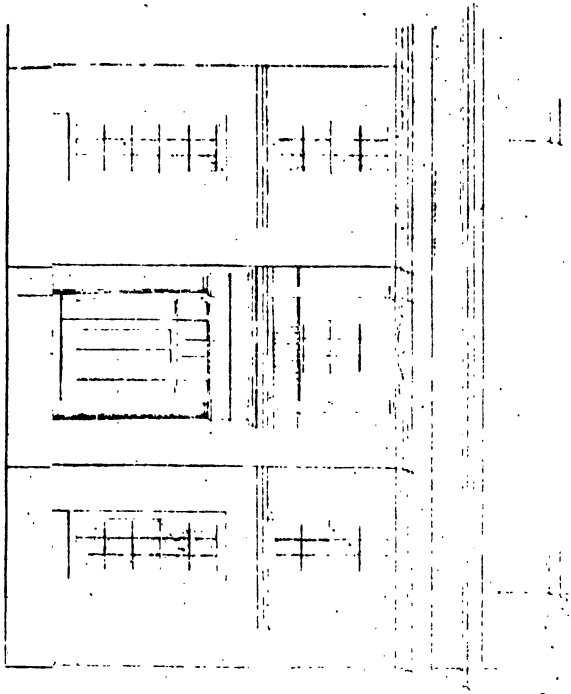
PLAN OF A GRECIAN HOUSE.

PLATE XL.

THIS plate represents a ground plan of a house in the Grecian style. We consider this kind of house very economical, both in respect to expense and convenience. By an examination of the plate it will be understood, as the sizes are marked, &c.



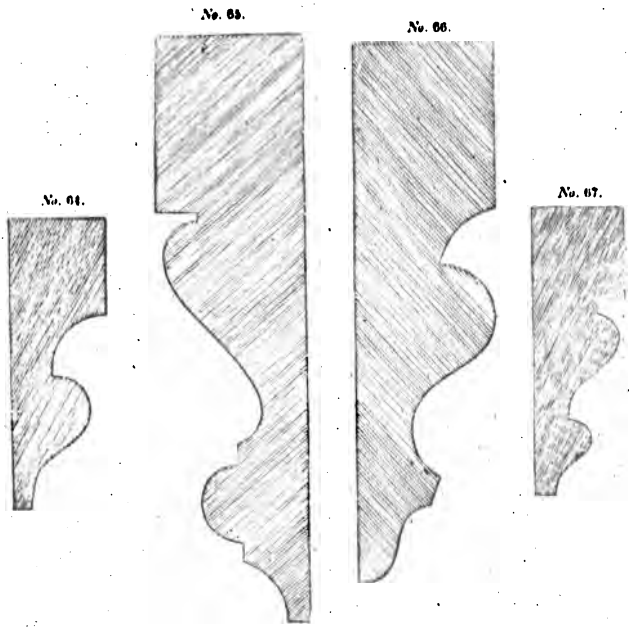
Nos. 61, 62, 63, 64, 65, 66, 67, exhibit seven designs for base, and archi trave mouldings, full size, for practice

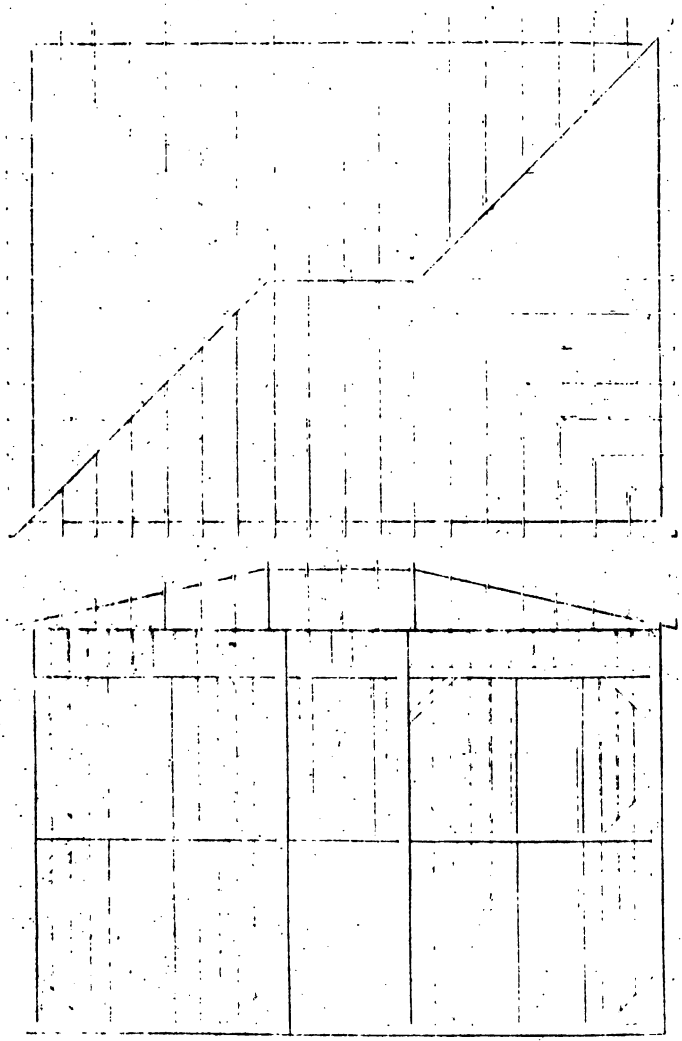


FRONT ELEVATION.

Plate XLI.

This plate presents a front elevation of the Grecian house shown in the last sketch. It is a chaste, simple, and graceful design, and one, we think, which will meet the expectations of any gentleman who may see fit to adopt it in building.


No. 64.
No. 65.
No. 66.
No. 67.

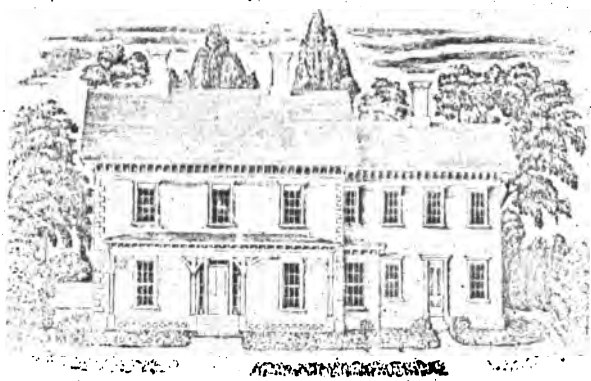


ELEVATION OF FRAME.

Plate XLII.

This plate shows an elevation of the framing and plan of the roof so plainly as to need no explanation. The sizes of the timbers, height, and spaces, are all marked, &c.

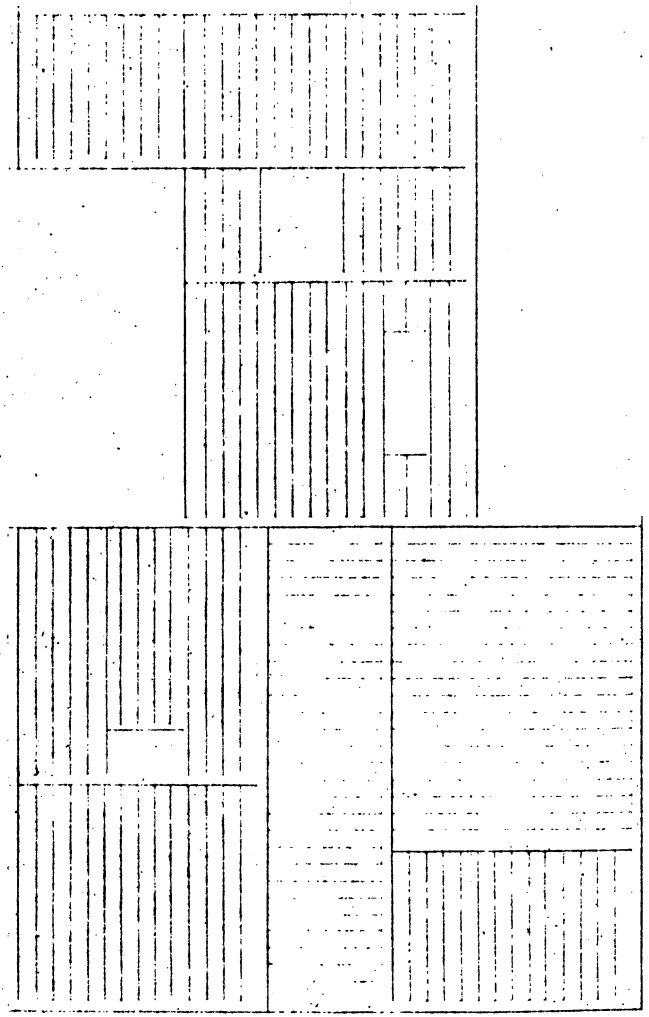
No. 68.



The front elevation, No. 68, as represented above, exhibits a modern and beautifully-constructed house, built for the Rev. Seth Sweetser, of Worcester, Mass., and designed by Mr. Elbridge Boyden.

No. 69 shows the end elevation of the same house.

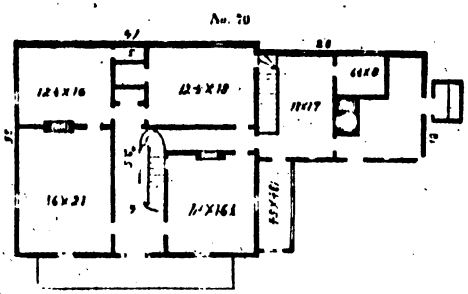
No. 69.



GROUND FLOOR FRAMING.

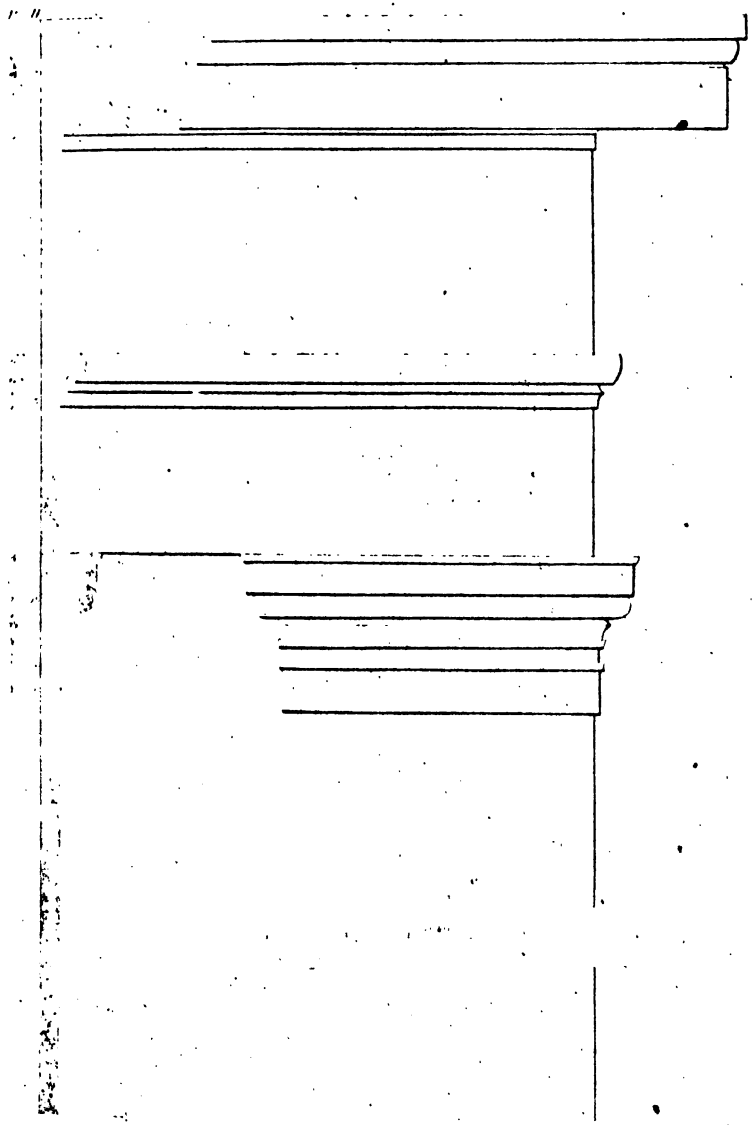
Plate XLIII.

This plate shows the frame for the ground floor of the Grecian house, with a proper arrangement of timbers, and their sizes marked, &c.



No. 70 presents the ground-plan to foregoing front and end elevations, Nos. 68 and 69.

Though the size of the main house is but thirty-five feet by forty-one feet, with an ell of twenty-eight feet by eighteen feet, for symmetry of form, size, and connection of apartments, and abundance and convenience of closet-room, this house is much approved and admired. On the ground-floor, in front, is a parlor, sixteen by twenty-one feet; hall, twenty-five by nine feet; and sitting-room, fourteen by sixteen and one half feet. In rear of parlor, library, twelve and one half by sixteen feet; and in rear of sitting-room, dining-room, twelve and one half by eighteen and one half feet, with three large closets, admirably situated for convenience; while the ell contains a kitchen, thirteen by seventeen feet, back stairway, large pantry-closet, and an ample wash and wood room. The conservatory, thirteen and one half by five and one half feet, and piazza in front, add much to the beauty and convenience of the structure, at but small increase of the expense. Estimated cost of this house, $3000.



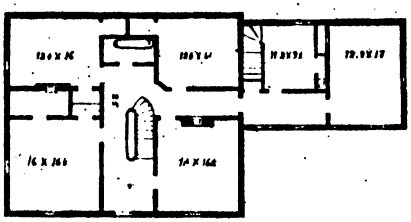
ANTA AND ENTABLATURE.

Plate XLIV.

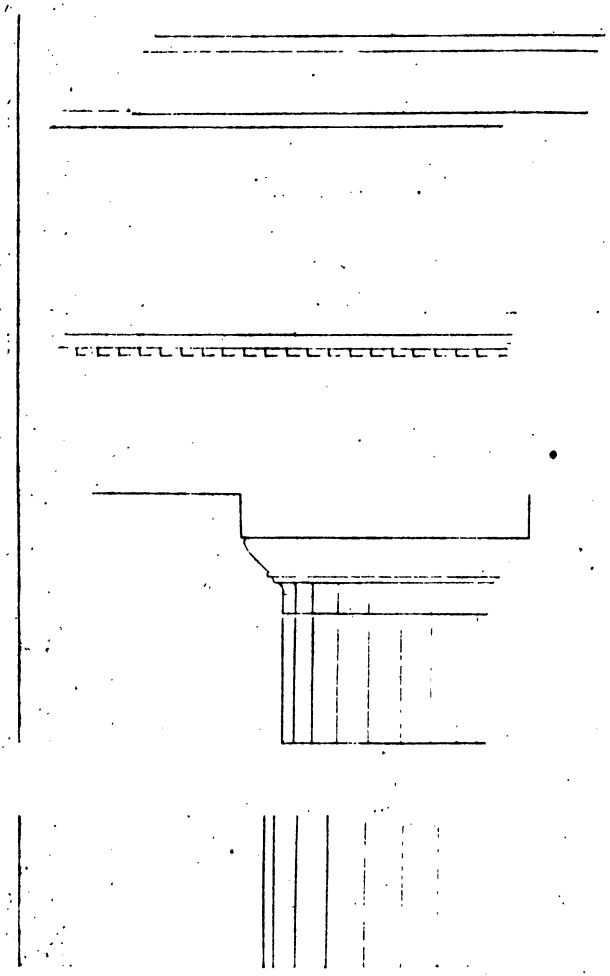
Here we have represented an anta and entablature suitable for this house. It is figured in minutes for the sake of convenience; and drawn to a scale of one inch to a foot.

The dark part on the left hand shows a section, or form, of all the members, &c.

No. 71.



No. 71 presents the plan of the second floor, with two front chambers, sixteen and one half by sixteen feet, and fourteen by sixteen and one half feet, two large bed-rooms, ample bath-room and closets, and in the ell a large chamber and sleeping-room, with closets from each, with width of passage-ways, and completeness of connection, which render the chambers eminently pleasant and convenient.



DETAILS.

Plate XLV.

On this plate are shown a column and entablature, designed for the portico of the Grecian house. The whole height is ten diameters; the entablature being two. The plate is figured in minutes, and drawn to a scale of one eighth of an inch to an inch. The latter division adapts it to this place; but the former is more suitable for diminishing or enlarging an order or design.

The following will show how this is done. The column at the base is sixteen inches; this is divided into 60 parts, for minutes. (See the rule given in the description of the Tuscan order.) Now, if we wish to make this larger or smaller, we should still make the same number of minutes (sixty) in the diameter of the column, and give every member the same number marked opposite under *H*, (height,) and *P*, (projection.) It follows that the members are regulated by the minutes, which are greater or less as the case may be.

This is a beautiful design for a portico, and may be executed, in almost any place, with success.

DETAILS.

Plate XLVI.

Sections of an elevation of the steps, buttresses, door, door-frame, column, and of that part of the entablature which rests on the column; also, of the ceiling of the portico.

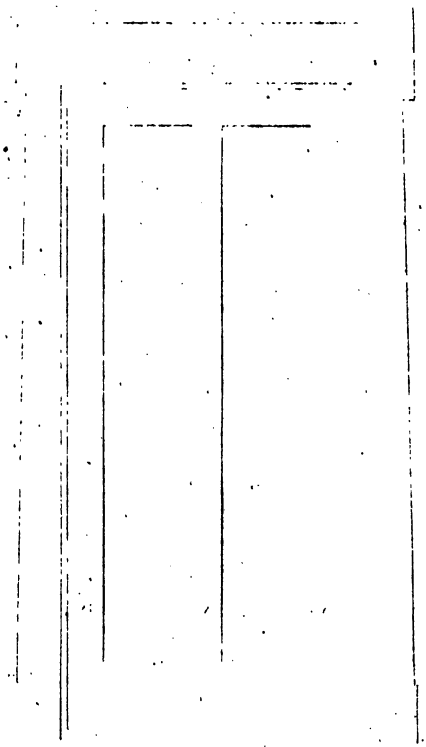
The whole is drawn to a scale of one half of an inch to a foot.

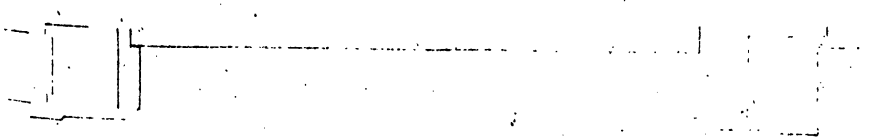
DETAILS.

PLATE XLVII.

Fig. 1.—Sections of the door-stile, panel, and moulding, half the real size.

Fig. 2.—A plan of the portico, shown in the preceding plate, drawn to the same scale.





DETAILS.

Plate XLVIII.

Figs. 1 and 2 are designs for inside doors and their finish, which are suitable for this house, drawn to a scale of three fourths of an inch to a foot.

Fig. 3.—A plan of a door-frame with the door closed, drawn to a scale of one and a half inches to a foot.

DETAILS.

Plate XLIX.

Fig. 1.—An architrave of full size for the preceding plate, which we have executed in several instances; and it has never failed, in any suitable position, to give a good effect.

Fig. 2.—Section of a window, with shutters and all the appendages in detail, drawn to a scale of one inch and a half to a foot. *A*, architrave; *B*, plastering; *C*, stud; *D*, back-lining; *E*, back-flap; *F*, box-leaf of shutters; *GG*, studs; *OO*, weights; *H*, face-lining; *I*, sheathing; *L*, shutters closed.

Fig. 1

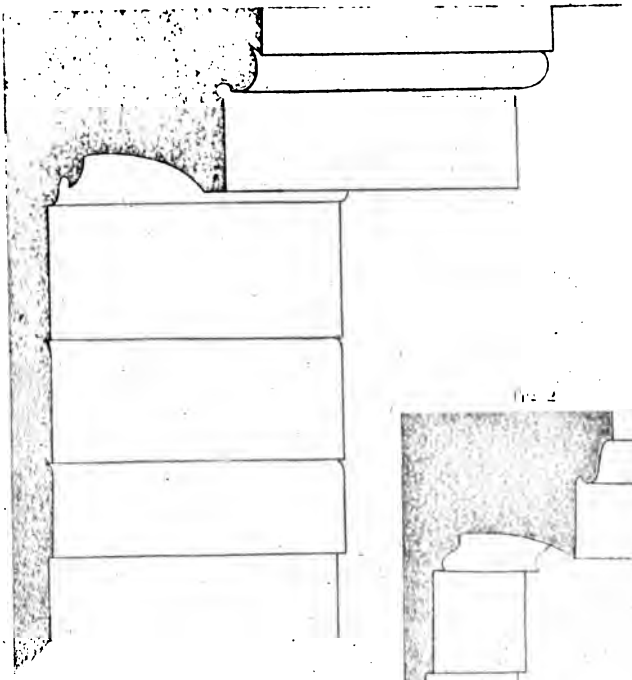


Fig. 2

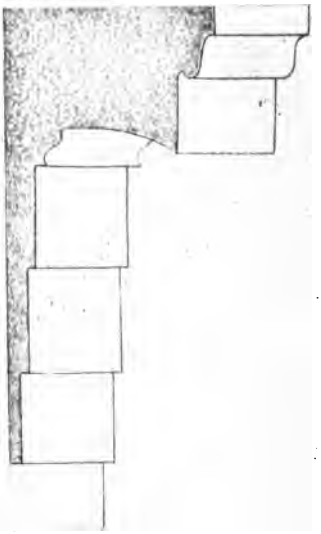
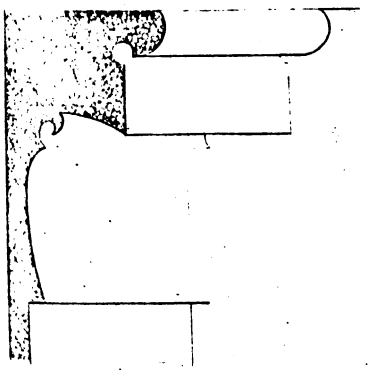


Fig. 3



STUCCO CORNICES.

Plate L.

On this plate are three designs for stucco cornices.
Fig. 1. — Cornice for the drawing-room.
Fig. 2. — Cornice for the parlor.
Fig. 3. — Cornice for the vestibule and hall.
These designs are drawn to a scale of three inches to a foot.

CHURCHES.

We have placed in the front of our work designs for churches in different styles.

Fig. 1.

This church is the Saint George, erected in the city of New York, 16th Street, and is an elegant structure, recently built.

Fig. 2, 3.

A CHURCH IN THE DECORATED ENGLISH STYLE.

This church measures 52 feet in front, and 80 feet in flank, besides the porch, which is 18 feet square on the plan. It contains, on the first floor, 80 pews, 3 feet wide, and 9 feet long, and will seat, comfortably, 525 persons. A gallery for the organ and singers may be made over the entry, and extend to the dotted line on the plan. The side of the tower next to the main body of the building will be open into the gallery, so as to make a recess for the organ. The top of the spire will be 140 feet from the ground.

We have shown views of the ground plan and tower, leaving the general style of the front optional. A very pleasing effect would be produced by making the doors and windows in style of those inserted in the tower, in size according to position.

Fig. 4, 5.

ITALIAN CHURCH.

We have here shown a plan and elevation of a church in the modern Italian style, with a portico of Ionic columns, the entablature of which should be carried entirely round the building. The style and tower we leave for the taste of the builder.

Fig. 6.

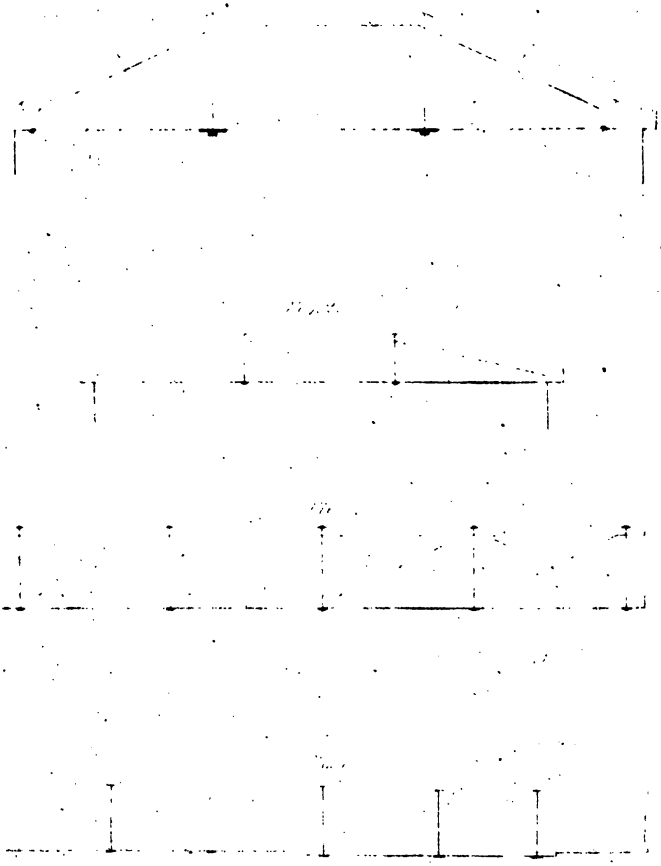
This church was erected in 1851, in the city of Worcester, Massachusetts, for the Rev. Dr. Hill, and is a beautiful modern church, the tower being of a new design.

Fig. 7.

Plan and elevation of pulpit for the church in the Decorated English style.

Fig. 8.

Plan and elevation of pulpit for the church in the Italian style.



CARPENTRY.

PLATE LI.

Fig. 1 is an example of a truss roof of forty feet span. The queen-posts are represented to be made of iron, instead of wood, as is usually the case. The particular advantage of the former mode over the latter is this: the settling of the timbers caused by the shrinking of the posts is done away with. The sizes of all the timbers, &c., suitable for this roof, are given below. This kind of truss may be extended to forty-five feet with safety.

Sizes of materials to be used in this truss:

Tie-beam,	12 × 10
Principal rafter,	9 × 8
Straining beams,	9 × 8
Struts,	8 × 2
Purlins,	8 × 6
Jack rafters,	6 × 2
Iron queen-posts,	1¼ round.
Bolts at the foot of the rafters,	¾ "
Coving joists,	8 × 3

We will here observe, that "the weight of the timber and boarding of the roof is equal to about five pounds on each superficial foot, and the weight of the slates, eleven pounds; these sums, added together, make sixteen pounds, which is the permanent load on each superficial foot."

Fig. 2 is designed for a truss of thirty feet span. It may be employed in any place where no very great strength is required. Timber which is six inches by ten will be about the right size for this truss. The mode of construction will be readily understood by inspection of the figure.

Fig. 3 represents a gallery truss of forty feet span, which will need no explanation. The sizes of the timbers to be used in *this* kind of truss may be as follows:

Lower timbers,	10 × 8
Struts,	8 × 2
Upper timbers,	8 × 8
Iron rods,	1 round.

Fig. 4 is designed for scarfing beams where great nicety is required It will be observed that iron plates are represented on two sides.

The first three figures on this plate are drawn to a scale of one eighth of an inch to a foot.

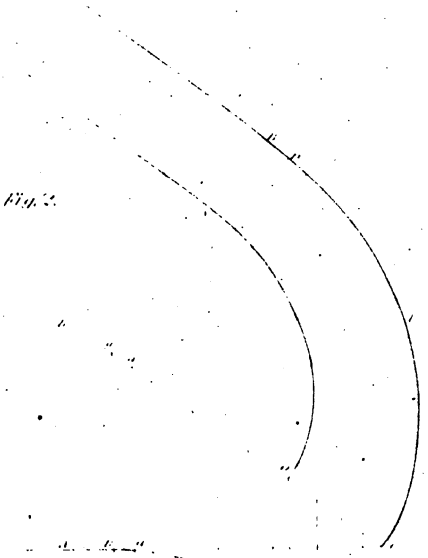


Fig. 2.

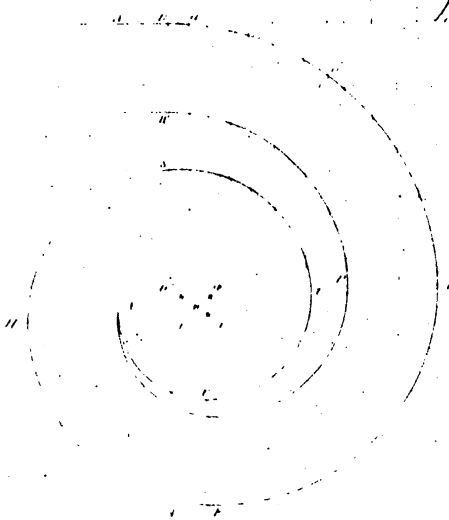


Fig. 1.

Plate LII.

Fig. 1 shows a method of drawing a scroll for stairs.

Let *AB* be the given breadth, which is here sixteen inches; divide *AB* into eleven equal parts, make *AF* equal to one of those parts, and join *BF*; then bisect *BA*, and *BF*, at 2 3, in the centre of *BA*; make 2 *D* equal to 2 3; then, with the dividers on *D*, with a radius of *DB*, intersect *DK*; draw *DK* perpendicular to *AB*, and *HK* at right angles to *BF*, intersecting *BF* at *o*; draw *EF* parallel to *AB*; draw the diagonals *DI EJ*, which will form the centres; then, with one foot of the dividers on *D*, describe the arc *BK*; and on *E* the arc *KF*; and on *I* the arc *FH*; and on *J* the arc *HS*; and on *L* the arc *ST*; and on *M* forming the arc *TU*; and on *R* the arc *UV*; which will complete the spiral curve. Proceed with the same centres to obtain the inside of the rail, commencing at *W*.

Fig. 2 shows the method of obtaining the face mould for a scroll.

Let *ABC* be the pitch board; make *aB* in Fig. 2 equal to *BD* in Fig. 1, also *aD* in Fig. 2 equal to *ae* in Fig. 1. Proceed with all the ordinates in the same manner, both on the inner and outer edges of the rail; then trace the curve line *BC*, and *SO*, and we have the mould complete.

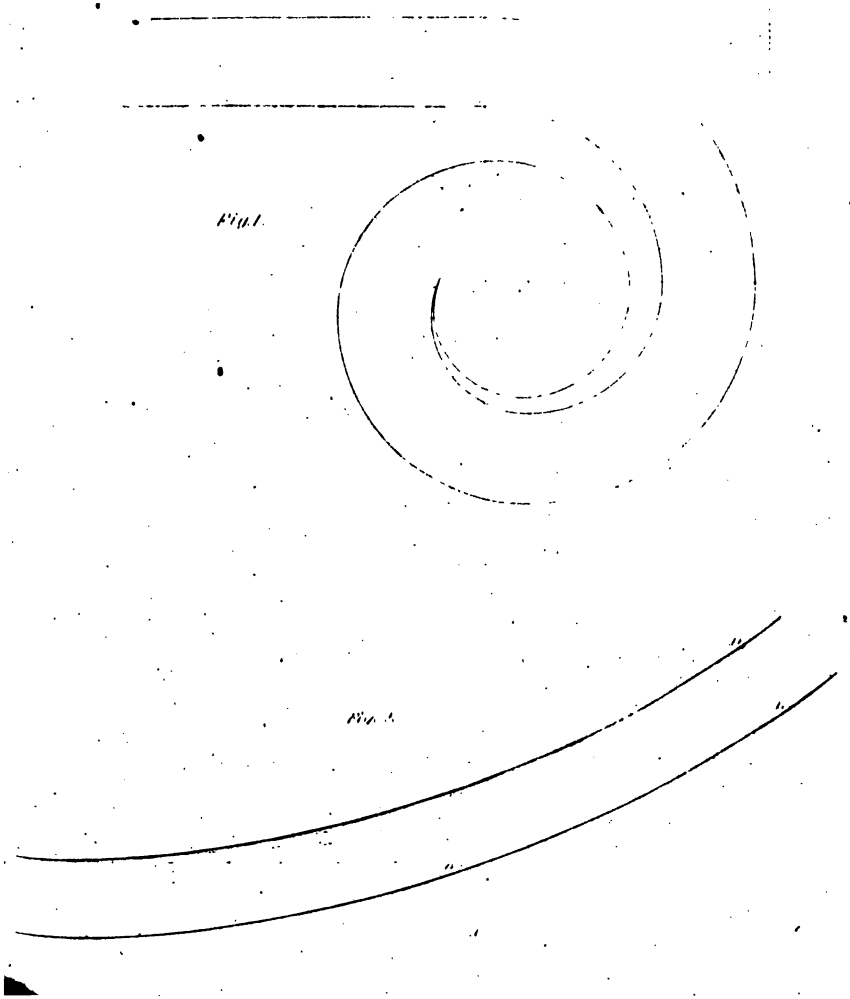


Plate LIII.

Fig. 1 shows the method of forming a curtail step. It is drawn on the same scale of the scroll, which is one quarter the full size; the centres are the same as in the scroll. We think this will be readily understood without further explanation, as the lines are described on the plate.

Fig. 2 shows the method of obtaining the falling mould of the scroll in the preceding plate. Let *ABC* be the *pitch board*, and *EC* the *stretchout* from *B* to *F*, Fig. 1 of the preceding plate. Then set up from *B* to *D*, and *E* to *F*, the depth of the rail. Draw *DG* parallel to *BA*, and *FG* parallel to *EA*; divide *FG* and *DG* each into an equal number of parts; then draw intersecting lines as shown in the drawings, and trace the curve line *FD*, and we have the upper edge of the mould; the lower edge may be obtained by gauging.

PLATE LIV.

On plate 54, *A B*, Fig. 1 being the ground-plan of the semi-circular part, having a portion of straight rail attached.

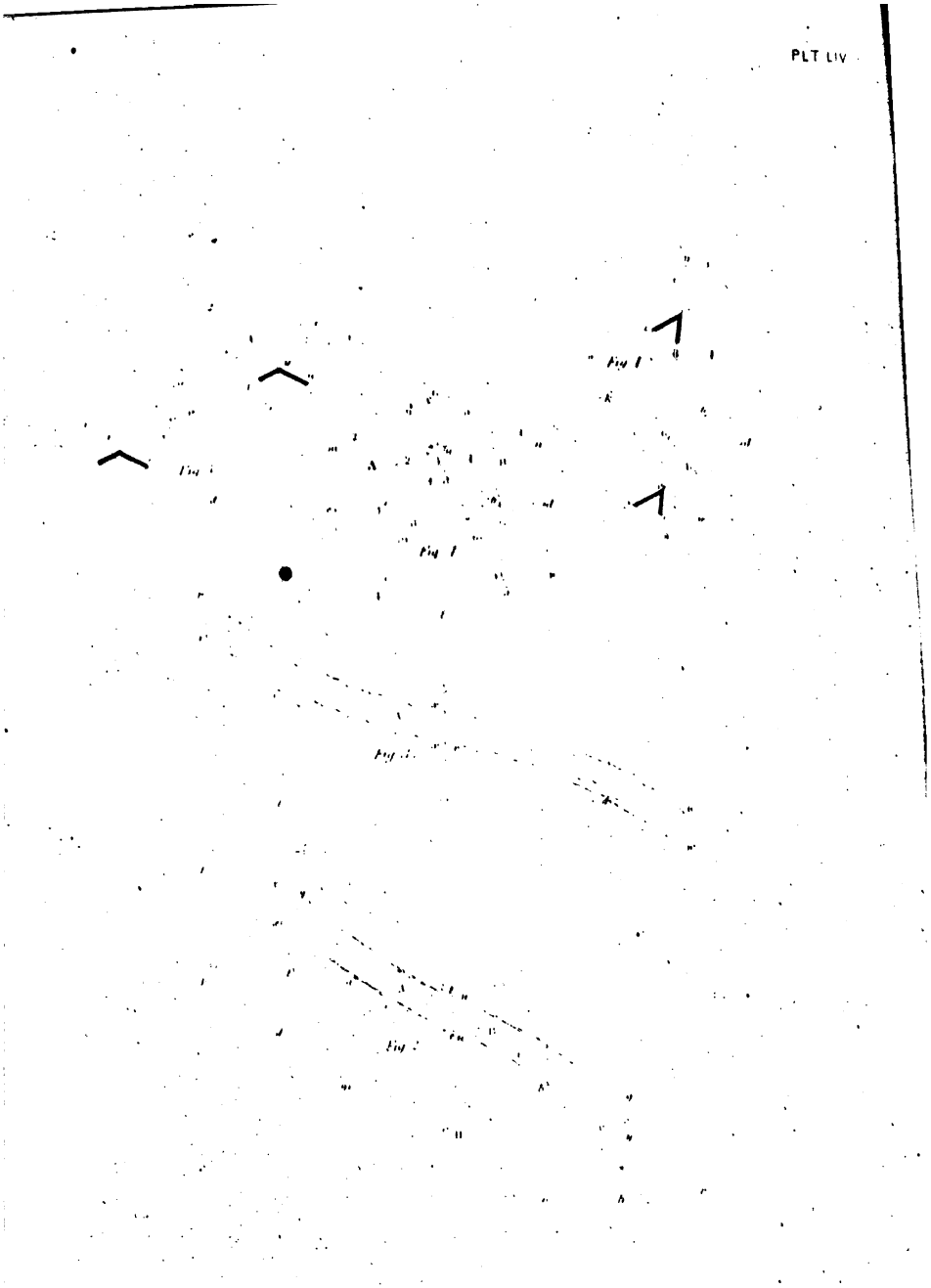
At *a b* and *c d* describe the points *e* and *f*, and from the point *e f* draw lines through *a b* and *c d* to the tangent lines *n m* and *j k*, which lines will be the stretch-outs of the concave and convex semi-circumference of the given plan. To obtain the concave falling-mould, Fig. 2, draw the horizontal line *m b* equal to the concave stretch-out: at the point *b* place the pitch-board *b n r*. Let *m a* be equal to the height of the riser, and divide it into four equal parts: the first and third part gives the point *x* and *e*; at the point *a b* place the pitch-board *a j l*; then draw the lines *j e*, *e x*, and *x v*; then set up the thickness of the rail, and then apply the length of the straight part *s a* and *y b*, of the ground-plan, Fig. 1, to the base of the pitch-boards from *n* to *h*, and *a* to *f*; then erect the perpendiculars, and square across the rail, as is represented, and you have the mould complete. To obtain the joint in the centre of the semi-circular part, let drop the line *G H*, passing through the centres of the concave and convex falling mould, square across the mould, and the line will be the required joint; draw the lines *u u*, and *z z*, which will be the required overwood; apply the overwood to the ground-plan, Fig. 1; then draw the lines *C O*, touching *v* and *z d*, and *O Z*, and *d s* will be the height for the parts *B* and *A* of said mould. The casings are formed as represented by the intersecting lines.

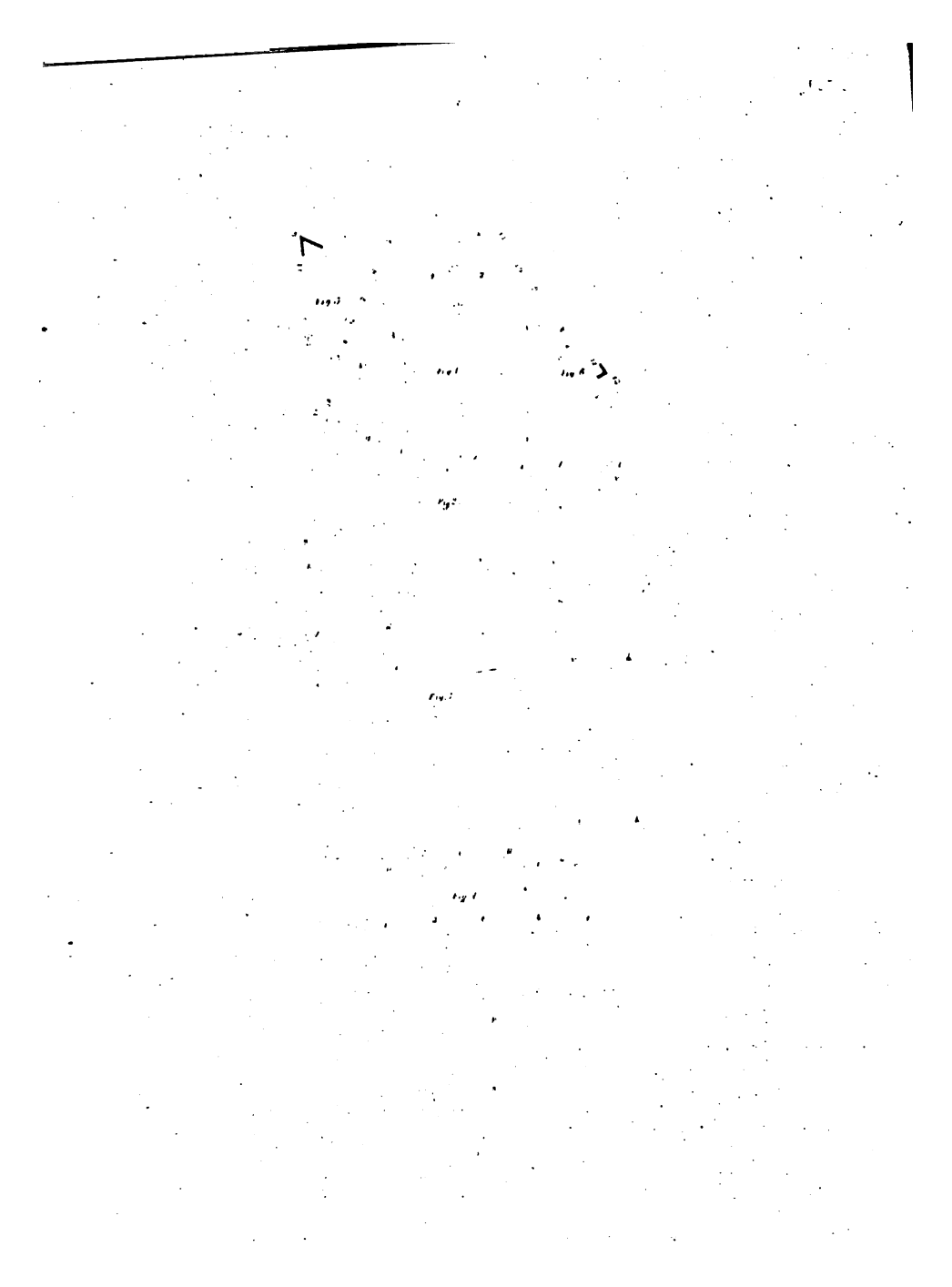
The convex falling-mould, Fig. 3, is obtained in the same manner as the concave at Fig. 2.

Let *j d*, the base Fig. 3, be equal to *j k*, the stretch-out in Fig. 1; *j c* is equal to the height of a rise of *d w*, and *c r* equal to the straight part, as in Fig. 2; the casings and the overwood are obtained in the same manner as before, and you will have your convex falling-mould.

How to obtain the face-moulds, Fig. 4 and 5, from the ground-plan.

At the part *B*, Fig. 1, draw the chord-line 5 9 touching the points *y z*; including the over-wood. Erect perpendicular lines from said chord-lines at 5 *y* 6 7 8 *Z* and 9, through the points *v y d b* and *Z*; draw *O Y* parallel to the chord-line; then take the height, *O Z*, Fig. 2, and apply it from *O* to *Z*, Fig. 4; then draw 5 9, touching the point *y* at the angles; *z y* is the pitch-bevel obtained. Draw lines at right angles to 9 5, and from the points 5 6 7 8 9; then take the several distances, 5 *W*, 6 *d*, 7 *b*, 8 4 4, and 9 *X*, from the chord-





line, Fig. 1, and apply them upon the lines carried out at right angles from 5 9 from the points 5 6 7 8 and 9, to *w d b* 44 and *x*; draw the line *x Z*, which will be the end of the required mould.

The points *z* 4 *b* and *x* 4 *d* being obtained, describe the arcs through them, and *b y* and *d w* will be the length at the straight part, and *y w* the end of the required mould.

The face-mould, Fig. 5, is obtained in the same manner as in Fig. 4, the straight part being thrown up, and the height from the parallel lines at *d* to the hypothenuse at *s* being obtained at *d s*, Fig. 2.

The diagrams 4 and 5 show the manner of applying the face-moulds to both sides of the plank.

From the part *z* and *y*, Fig. 4, and *u* and *S*, Fig. 5, at the inner edge of the plank, the pitch-bevels being obtained and applied across the edge *z y*, Fig. 4, and *u s*, Fig. 5, will be the angle of inclination to the rail-pieces. Then tracing the line of the mould on both sides of the plank; then cut out your rail-piece; then it will be ready for the application of the falling-moulds.

Take the part *B*, Fig. 2, of the concave falling-mould, which is of paper, and apply it to the concave edge of the rail-piece at Fig. 4, having the plumb-lines *z z* of the over-wood, Fig. 2, applied to the lines of the pitch-bevels *z z* and *y y*, then the plumb-line *y y* of said mould will coincide with the line *y y* of the pitch-bevel; then mark the joints *y v* and *u z*, and on the upper edge at *y*, and the lower edge at *z*, of said joints, square across the ends of said rail-piece.

Then apply the convex mould to the convex side, and you will have the required piece.

The upper wreath at *A*, Fig. 5, is formed in the same manner as *B*, Fig. 4.

Plate LV.

Shows the manner of drawing a continued rail to a straight flight of stairs, easing up on the landing.

Let *A A*, Fig. 1, be the ground-plan of the circular part of the rail, with a portion of the straight rail attached, so as to bring the joint on the straight part of rail.

A B, Fig. 4, shows the manner of obtaining the stretch-out of the semi-circular part. *a b c d* is the diameters of the concave and convex semi-circumference of the rail.

1, 2, 3, and 4, as centres; draw the arcs intersecting at *P* and *S;* then draw the tangent lines *n o e k* of the concave and convex sides of the given plan. From the point *P* draw lines through 2 and 3, until it intersect at *n* and *o;* also from *S* through 1 and 4, until it intersects at *e* and *k;* then *N O* and *e k* will be the stretch-outs of the two semi-circular lines.

It will be observed that *A B*, Fig. 4, is the same as *A A*, Fig 1. Fig. 4 is to show the manner of obtaining the different points and their stretch-outs.

To obtain the falling-mould for the concave stretch-outs, Fig. 2 *N* and *O*, Fig. 4, erect perpendicular from the point *n* and *O* of the concave stretch-out to *c* and *d;* at the points *c*, place the upper angle of the pitch-board *a b c* and *e c*, the line of floor; draw *c i* equal to half a rise at right angle to *C e;* then draw the hypothenuse, *a I* and *I r*, parallel to the top of floor.

Let *d x* be equal to the straight part *O P*, of Fig. 1.

We will now form the casing. From the angle at *i*, up on the hypothenuse, measure off eight inches in length, which divide into six equal parts. Then take four of these parts, and apply it upon the opposite side of the angle at *I*, and then divide said distance into six equal parts; then draw intersecting lines, and the casing will be formed for the under side of the rail. Then set up the depth of the rail, square across it at each extremity of said casings, and from the points upon the upper side of the rail the upper casing may be formed.

Take the length of the straight part *g b* of Fig. 1, and apply it upon the base of the pitch-board *b* to *g*, Fig. 2.

Erect the perpendicular *g w*, and form *w* square across the rail, which line will be the joint; the joint at *J* in the centre is obtained by squaring across the rail at *j T;* then draw lines parallel to the perpendicular at *j* and *T*, which lines will be the over-wood necessary for the joints; which over-wood must be applied to the joint in Fig. 1, as readily perceived, at *r* square across the rail, which is the terminating joint.

From the lower joint draw *x y j r*, which is the given height for each piece.

The convex falling-mould, Fig. 3, is obtained in the same manner, from *c k*, the convex stretch-out, Fig. 4, as Fig. 2 was obtained.

To form the casing upon convex falling-mould, Fig. 3, so that it may coincide with the concave casing Fig. 2, take the distance from *z*, at the termination of the casing, to *d* at Fig. 2, and apply it up on the concave stretch-out from *O* to *r*, Fig. 4; then draw the line *r P*, and through its intersection with the concave at *z*, on the semi-circumference, draw *T U*, from the centre *T* to the convex semi-circumference *U;* then draw *s v* through the point of intersection at *u*, and *v k* will be the required distance. Apply said distance.

upon the mould from *k* to *v*, Fig. 3; divide the distance from *r* to the angle at *i* into six equal parts; the distance upon the hypothenuse from the angle at *i* is the same as the Fig. 2; then divide this distance as before, and complete the easing as represented, and your pattern is complete for the convex falling-mould.

We will now proceed to obtain our patterns Fig. 5 and 6. First draw a chord-line 1–2, and 3–4, taking in the over-wood on each pattern.

Then draw the lines 5 6 7 8 9 10 11, perpendicular to the chord; then draw the line 12 parallel to 1–2, at a convenient distance from the ground-plan *A A*; then take the rise of the rail *y j*, Fig. 2, and set it up to 13, which gives the bevel for to apply the pattern by, then draw 14 15 16 and 17, at right angles with 13; then apply the same distances from 13, the ground-plan measures from 1–2; then, by bending a thin piece of wood around the points, mark the required pattern.

Now, for applying the pattern to the plank: square one edge of the plank, apply the bevel at 13, and lay the pattern on each side, and saw out the rail-piece, and apply the paper pattern of the concave and convex falling-mould, and you have the required piece. You will proceed in the same manner for Fig. 6; first draw 5 6 7 8 9 10 11, as before.

Then draw 12 and 13, giving the rise from *v* to *r*, as in Fig 2; then proceed as before, until complete.

Plate LVI.

Exhibits the plan of forming the rail for a semi-circular stairs, with six winders, having fliers attached above and below.

A B C, Fig. 1, is the ground-plan of the rail; the lengths of the concave and convex semi-circumference of the ground-plan are obtained in the same manner as in the preceding plates. Take the length of the stretch-outs *r t* and apply the same upon a base line, Fig. 5; then take the height of the six winders, including one of the straight steps, and set it up at *t*; then apply the pitch-board of the straight steps *a* and *c*, the base of which is equal to the straight part *a* and *c*, Fig. 1. You will now proceed to form the easings as is represented on mould. When the easing is completed, you will take the distances, and apply them to the concave stretch-out, Fig. 1; then, as before in the preceding plate, carry them on to the convex stretch-out; then apply them to Fig. 6.

To draw Fig. 6, you will take the convex stretch-out *e* and *c*, and apply it to the base line; then set up the height as before, and apply your pitch-boards *A* and *C*, and your casings complete your rail-piece. The manner of forming the but-joints in the rail, on the ground-plan Fig. 1: Determine the joint, square across it with a line running to the centre of the well; draw dotted lines from each intersection, on the concave and convex semi-circumference, to *O* and *P*, and then carry them on to the stretch-outs; then take the distance from *r* to *i*, and *t* to *k*, and apply them to Fig. 5; raise a perpendicular to the rail; then square across the rail in the centre, which makes the joint on the concave falling-mould. You then proceed the same to carry the joints on to the convex.

Then draw the lines for the over-wood 1 2, Fig. 5, and apply the distance to the joints, Fig. 1. Then draw as in the preceding plate, Fig. 2, 3, and 4, taking the heights for each piece from Fig. 5, as represented by the horizontal lines, at the bottom of each joint.

Plate LVII.

Fig. 1 shows the plan of stairs having five winders, the well-hole being formed by two quadrantal parts, a larger and smaller one, which may be termed a quarter space.

Fig. 2 shows the plan and elevation of the veneer for the concave side of the stairs.

Fig. 3 shows the plan and elevation of the veneer, or skirting, for the convex side of the stairs.

Fig. 1 shows the ground-plan of the veneer.

To obtain their stretch-outs *h j*, let *a d* be equal to twice the radius *a c*; then, having *a d* as centres, describe the intersecting point at *b*; then, from *b*, draw a line through *a* to *h*, intersecting the tangent line (the stretch-out for the small quadrant is obtained in the same way), and *h j* will be the stretch-out of the two quadrants. Then draw lines 3 4 5 6 7 8, touching the points of the risers, to *b*; then carry them up to Fig. 2, which gives the width of the tread in the circular part.

S, the face side of the front string; the dotted lines at *s* showing the face of the bracket; *n n*, the line of nosing; *C C*, the plan of the rail; *r r r r*, the risers; *b b b*, the plank risers, secured to the studs *s s*, the wall-string.

G, the ground for the reception of the veneer; *B B*, the base upon the landing, having the upper end of the veneer attached.

Fig. 3. *A*, the part of the wall-string; *k j* the upper edge, and *u u* the lower; *r r r* the risers, and *t t* the treads. To obtain the length of the part *B* of the string for the convex side, proceed in the same manner as the concave; then 5 7 9 will be the stretch-outs for the winders. The line *k j* is the upper edge, and *j i* shows the junction of the part *B* to *A*.

Plate LVIII.

On plate 58 is represented a plan for a window frame, shutter, and blind. *A A*, studs; *B B*, weights; *C C*, sash; *D*, stop between sash and blind; *E E*, shutter; *F*, enclosing; *H*, outside face-casing; *I*, blind.

On plates 59, 60, 61, are three designs for eave cornices for two-story buildings. Scale, one-eighth of an inch to the inch.

On plate 62 is exhibited a design for a front door, with a projecting cap and bracket, suitable for a balcony on top, if desired.

Plate 63 is a detailed cornice and bracket, one-fourth full size, for same.

On plates 64, 65, are two designs for inside door finish. Scale one inch to a foot.

On plates 66, 67, are four designs for chimney-pieces, which may be executed in wood, two of them showing different designs for bracket; all drawn from a scale one inch to the foot.

Gates and Fences. — Plates 68, 69, exhibit four designs for fences and four designs for gates, which styles, it is believed, will be found very desirable.

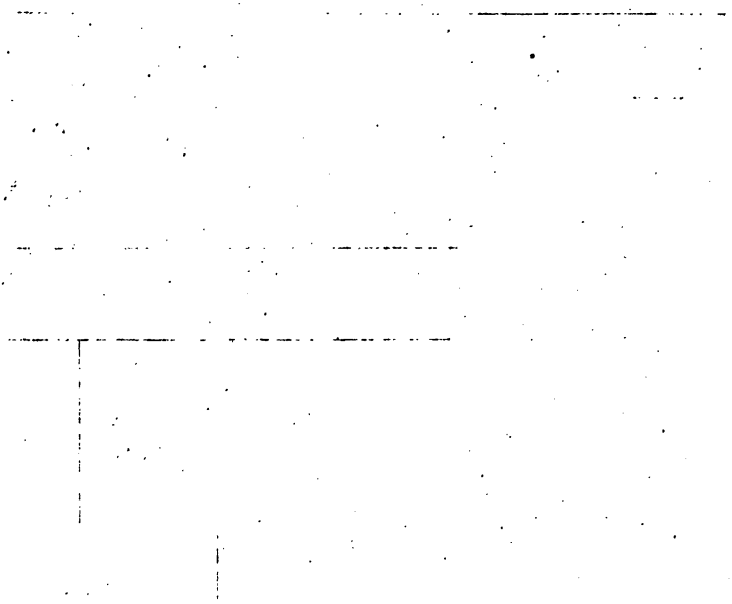
TABLE OF CIRCLES.

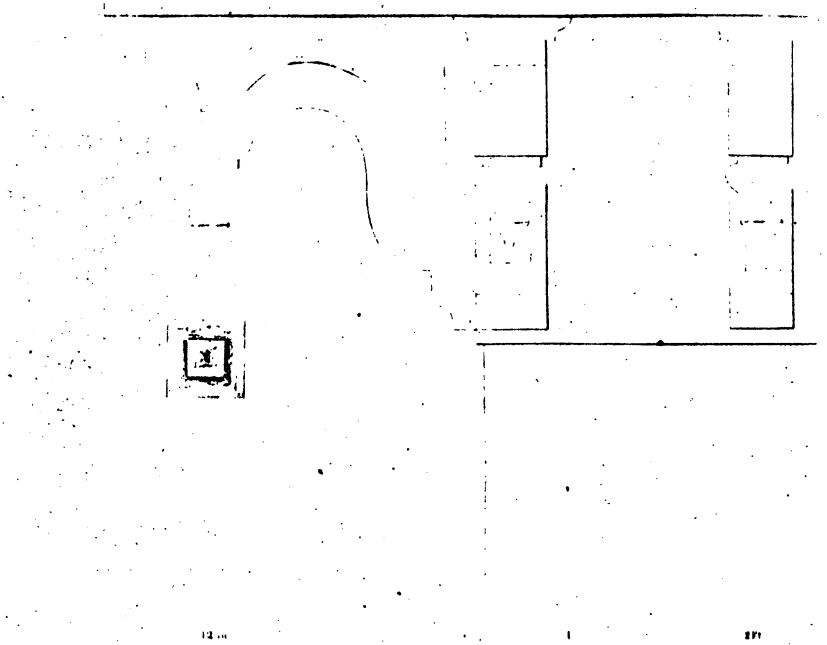
From Gregory's Mathematics.

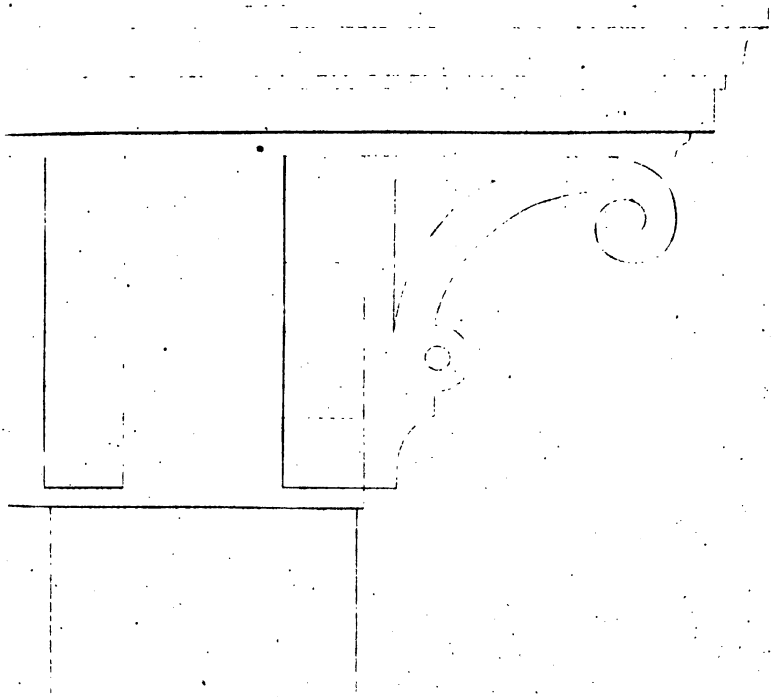
From this table may be found the circumference of a circle of any diameter, and the side of a square equal to the area of any given circle from 1 to 50 inches, feet, yards, &c.

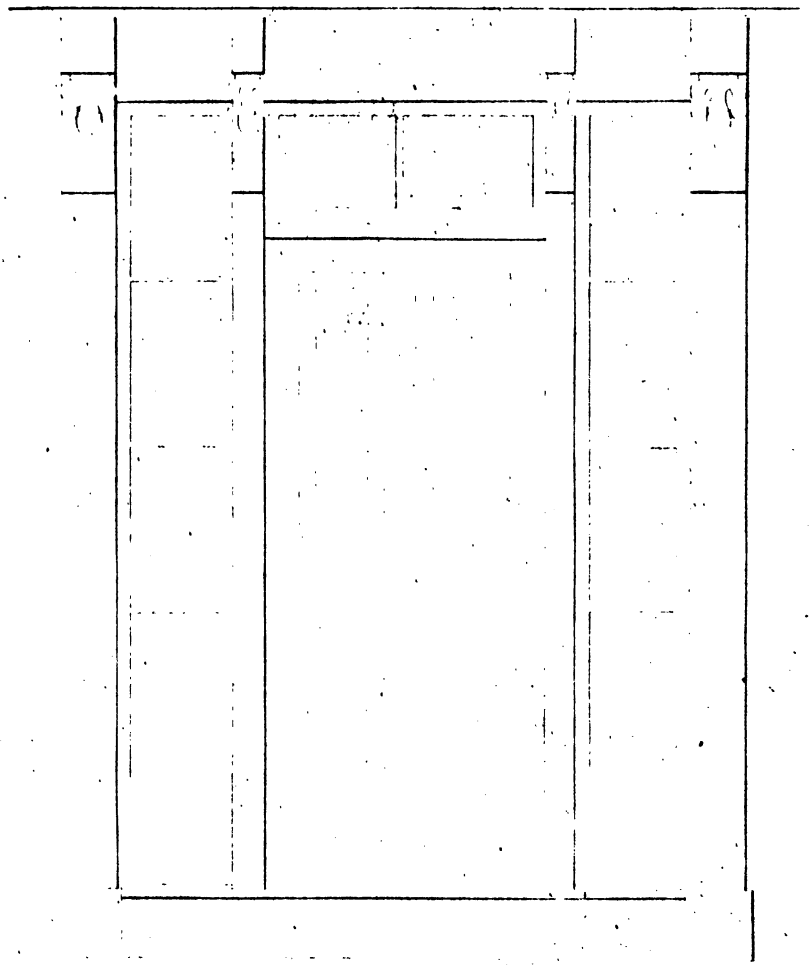
If the given diameter is in inches, the circumference, area, &c., set opposite, will be in inches if in feet, feet, &c.

Diam.	Circum.	Area	Side of equal Square	Diam.	Circum.	Area	Side of equal Square
	·7854	·0490	·2215	11 in.	34·557	95·033	9·7482
¼	1·5708	·1963	·4431	¼	35·343	99·402	9·9698
½				½	36·128	103·869	10·191
1 in.	3·1416	·7854	·8862	12 in.	37·699	113·097	10·631
¼	3·9270	1·2271	1·0775	¼	38·484	117·859	10·856
½	4·7124	1·7671	1·3293	½	39·270	122·718	11·077
2 in.	6·2832	3·1416	1·7724	13 in.	40·840	132·732	11·520
¼	7·0686	3·9760	1·9939	¼	41·626	137·880	11·742
½	7·8540	4·9087	2·2155	½	42·411	143·139	11·963
3 in.	9·4248	7·0686	2·6586	14 in.	43·982	153·938	12·406
¼	10·210	8·2957	2·8801	¼	44·767	159·485	12·628
½	10·995	9·6211	3·1017	½	45·553	165·130	12·850
4 in.	12·566	12·566	3·5448	15 in.	47·124	176·715	13·293
¼	13·351	14·186	3·7663	¼	47·909	182·661	13·514
½	14·137	15·904	3·9880	½	48·694	188·692	13·736
5 in.	15·708	19·635	4·4310	16 in.	50·265	201·062	14·179
¼	16·493	21·647	4·6525	¼	51·051	207·394	14·400
½	17·278	23·758	4·8741	½	51·836	213·825	14·622
6 in.	18·849	28·274	5·3172	17 in.	53·407	226·980	15·065
¼	19·635	30·679	5·5388	¼	54·192	233·705	15·286
½	20·420	33·183	5·7603	½	54·978	240·528	15·508
7 in.	21·991	38·484	6·2034	18 in.	56·548	254·469	15·951
¼	22·776	41·282	6·4250	¼	57·334	261·587	16·173
½	23·562	44·178	6·6465	½	58·119	268·803	16·394
8 in.	25·132	50·265	7·0897	19 in.	59·690	283·529	16·837
¼	25·918	53·456	7·3112	¼	60·475	291·039	17·060
½	26·703	56·745	7·5328	½	61·261	298·648	17·280
9 in.	28·274	63·617	7·9760	20 in.	62·832	314·160	17·721
¼	29·059	67·200	8·1974	¼	63·617	322·063	17·945
½	29·845	70·882	8·4190	½	64·402	330·064	18·167
10 in.	31·416	78·540	8·8620	21 in.	65·973	346·361	18·610
¼	32·201	82·516	9·0836	¼	66·759	354·657	18·831
½	32·986	86·590	9·3051	½	67·544	363·051	19·053









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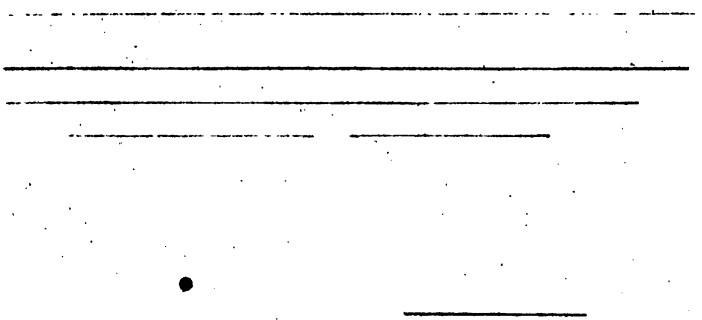

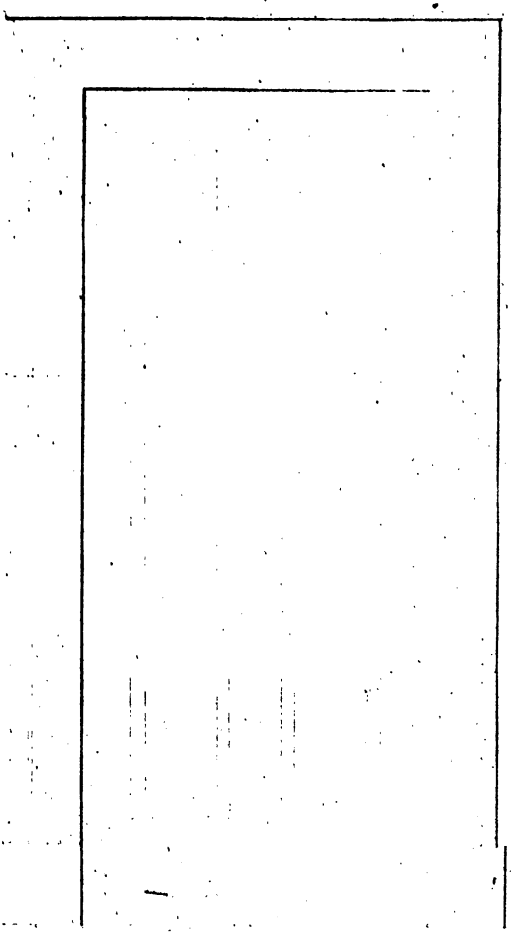

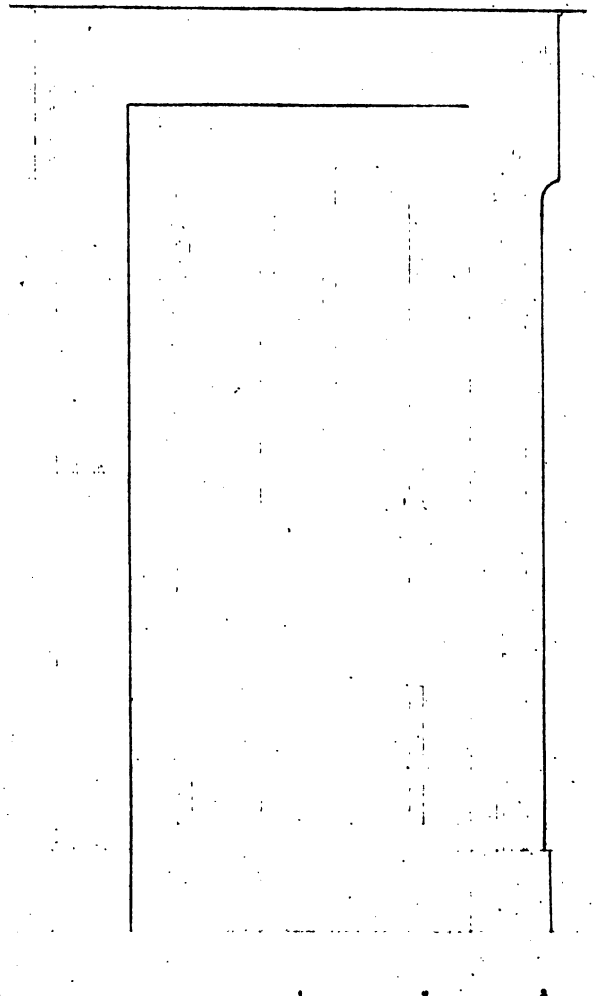

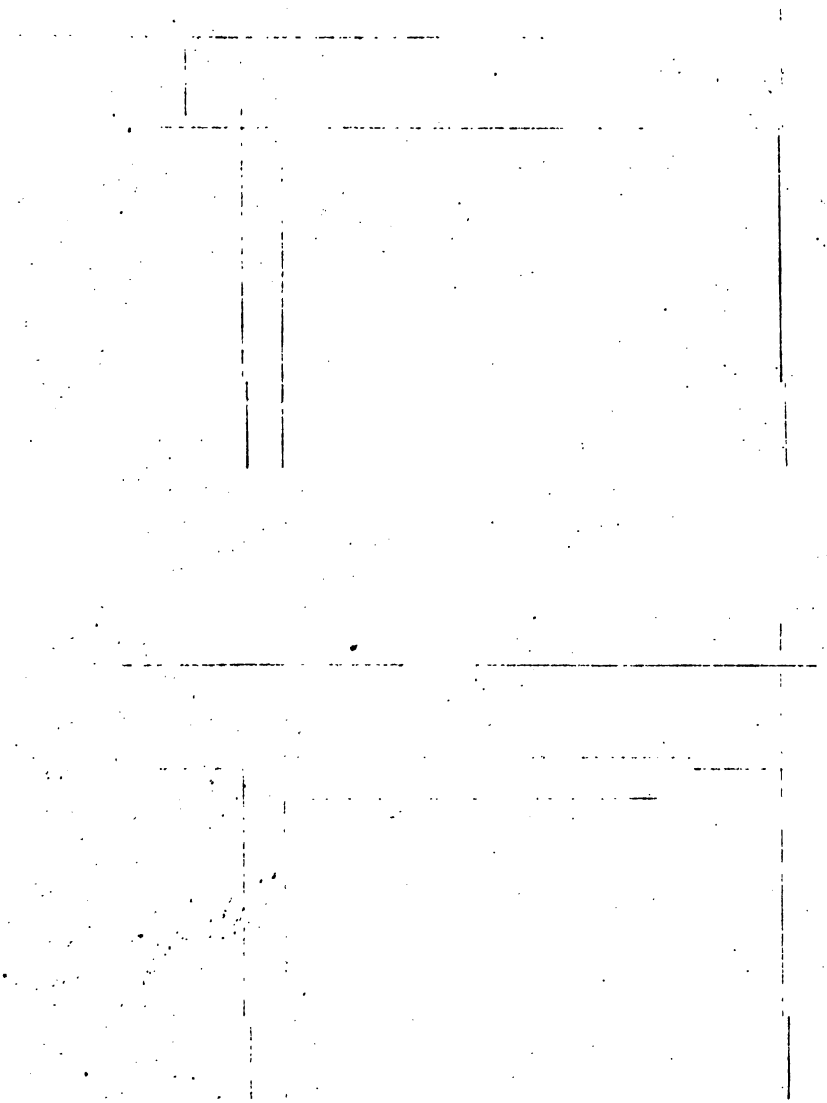

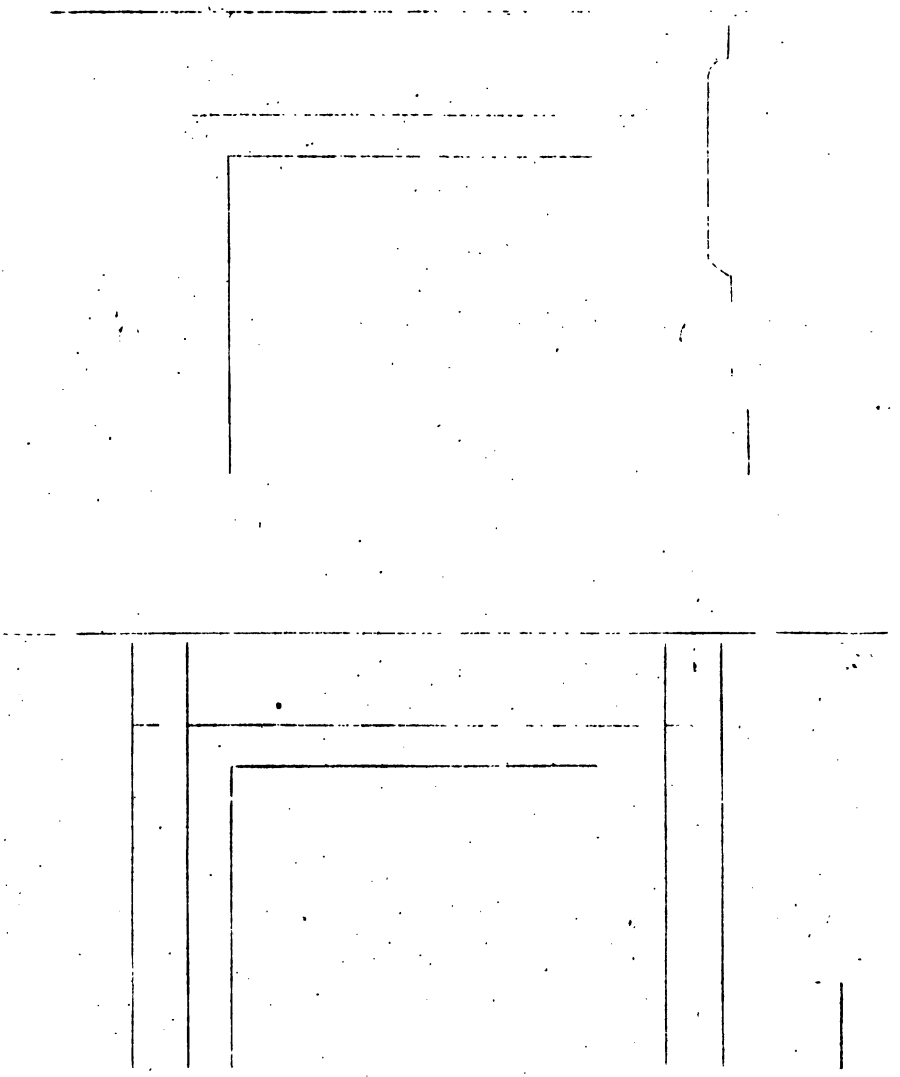

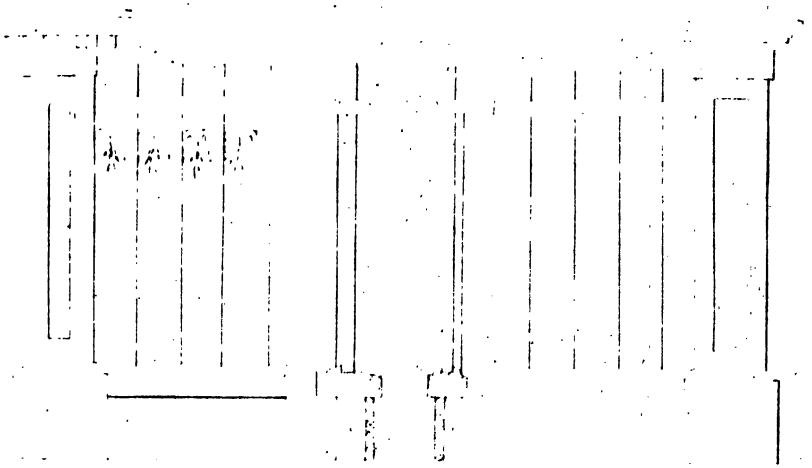

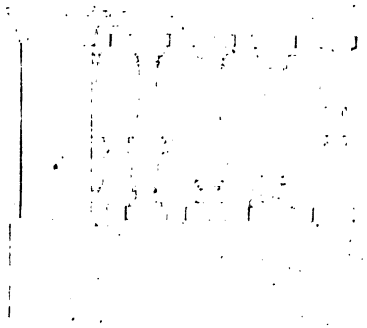

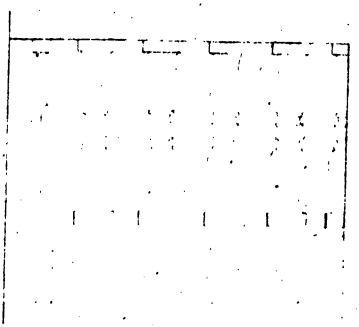

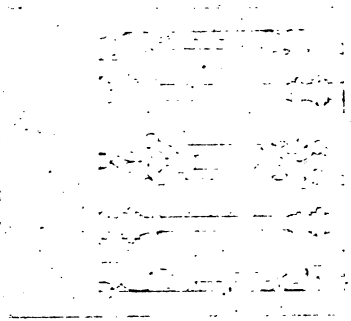

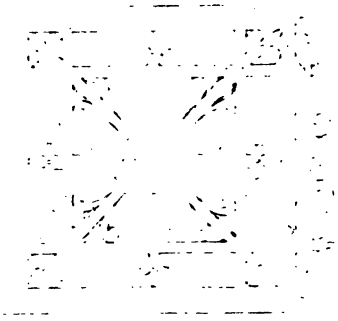

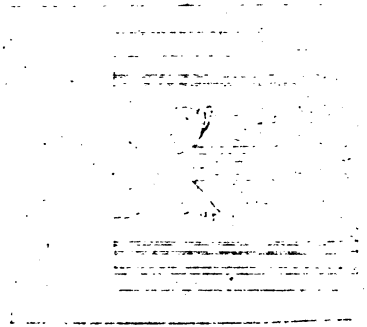

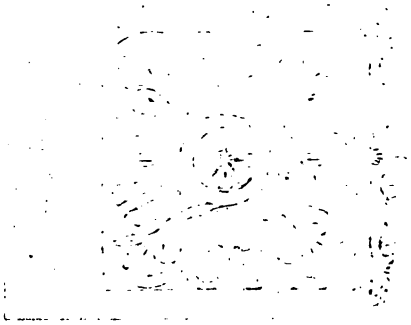

Diam.	Circum.	Area	Side of Equal Square	Diam.	Circum.	Area	Side of Equal Square
22 in.	69·115	380·133	19·496	36 in.	113·097	1017·87	31·903
¼	69·800	384·822	19·615	¼	113·883	1032·06	32·124
½	70·686	392·699	19·820	½	114·668	1046·39	32·346
23 in.	72·256	415·476	20·382	37 in.	116·239	1075·21	32·780
¼	73·042	421·557	20·531	¼	117·024	1089·70	33·001
½	73·827	433·731	20·835	½	117·810	1104·16	33·222
24 in.	75·398	452·390	21·268	38 in.	119·380	1134·11	33·675
¼	76·183	461·864	21·490	¼	120·166	1149·08	33·897
½	76·969	471·430	21·712	½	120·951	1164·15	34·118
25 in.	78·540	490·875	22·155	39 in.	122·522	1194·59	34·561
¼	79·325	500·711	22·370	¼	123·307	1209·95	34·782
½	80·110	510·708	22·598	½	124·093	1225·42	35·005
26 in.	81·681	530·930	23·041	40 in.	125·664	1256·64	35·448
¼	82·467	541·189	23·262	¼	126·449	1272·39	35·669
½	83·252	551·517	23·484	½	127·241	1288·25	35·891
27 in.	84·823	572·556	23·927	41 in.	128·805	1320·25	36·334
¼	85·608	583·208	24·149	¼	129·591	1336·30	36·555
½	86·394	593·958	24·370	½	130·376	1352·65	36·777
28 in.	87·964	615·753	24·813	42 in.	131·947	1385·11	37·220
¼	88·750	626·798	25·035	¼	132·732	1401·98	37·442
½	89·535	637·941	25·256	½	133·518	1418·02	37·663
29 in.	91·106	660·521	25·699	43 in.	135·088	1452·20	38·106
¼	91·891	671·958	25·921	¼	135·874	1469·13	38·328
½	92·677	683·491	26·143	½	136·659	1486·17	38·549
30 in.	94·248	706·860	26·586	44 in.	138·230	1520·53	38·993
¼	95·033	718·690	26·807	¼	139·015	1537·86	39·214
½	95·818	730·618	27·029	½	139·801	1555·28	39·436
31 in.	97·389	754·769	27·472	45 in.	141·372	1590·43	39·879
¼	98·175	766·992	27·693	¼	142·157	1608·15	40·100
½	98·968	779·313	27·915	½	142·942	1625·97	40·322
32 in.	100·531	803·249	28·358	46 in.	144·513	1661·90	40·765
¼	101·316	816·805	28·580	¼	145·299	1680·04	40·986
½	102·102	829·578	28·801	½	146·084	1698·23	41·208
33 in.	103·672	855·30	29·244	47 in.	147·655	1735·91	41·651
¼	104·458	868·30	29·466	¼	148·440	1753·15	41·873
½	105·243	881·41	29·687	½	149·226	1772·05	42·094
34 in.	106·814	907·92	30·131	48 in.	150·796	1809·56	42·537
¼	107·599	921·32	30·352	¼	151·582	1828·16	42·759
½	108·385	934·82	30·574	½	152·367	1847·45	42·980
35 in.	109·956	962·11	31·017	49 in.	153·938	1885·74	43·423
¼	110·741	975·90	31·238	¼	154·723	1905·03	43·645
½	111·526	989·81	31·460	½	155·509	1924·12	43·867

MISCELLANEOUS.

The following are the results of experiments made by Mr. Emerson, which state the load that may be safely borne by a square inch rod of each:

	Pounds Avoirdupois
Iron rod, an inch square, will bear,	76,100
Brass,	35,600
Hempen rope,	19,600
Ivory,	15,700
Oak, box, yew, plum-tree,	7,850
Elm, ash, beech,	6,070
Walnut, plum,	5,350
Red pine, holly, elder, plum, crab,	5,000
Cherry, hazel,	4,760
Alder, asp, birch, willow,	4,290
Lead,	130
Free-stone,	914

ACTUAL COHESION.

Gold Cast,	24,000 20,000
Silver Cast,	40,000 43,000
Copper Cast,	28,700
Steel Bar, Soft,	120,000
Steel Bar, Razor tempered,	150,000
Lead Cast,	860
Zinc,	2,600

CIRCLES AND DIAMETERS.

To find the circumference of a circle, the diameter being given; or, to find the diameter, the circumference being given, we have the following

RULE.

Multiply 3.1416 by the diameter, and the product will be the circumference; or,

Divide the circumference by 3.1416, and the quotient is the diameter.

Note.—As 22 is to 7, so is the circumference to the diameter; or, as 7 is to 22, so is the diameter to the circumference.

EXAMPLES.

1. What is the circumference of a circle whose diameter is 15?

$$3.1416 \times 15 = 47.124 = \textit{circumference}.$$

2. What is the diameter of a circle whose circumference is 179?

$$\frac{179.000}{3.1416} = 56.97 = \textit{diameter}.$$

3. Required the circumference of a circle whose diameter is 30 feet.

Ans. 94.248.

4. Find the circumference of a circle whose diameter is 13 feet.

Ans. 40.84.

5. Required the diameter of a circle whose circumference is 24884.6136.

Ans. 7921.

6. The circumference of a circle being 37.6992, what is the diameter?

Ans. 12.

The following Table, taken from the "Mechanic's Own Book," contains diameters and circumferences in inches and parts, from half an inch to 65 inches.

Diameter in inches & half.	Circumference in inches and parts.	Diameter in inches & half.	Circumference in inches and parts.	Diameter in inches & half.	Circumference in inches and parts.	Diameter in inches & half.	Circumference in inches and parts.
½	1.57	7½	23.56	14½	45.55	21½	67.51
1	3.14	8	25.13	15	47.12	22	69.11
1½	4.71	8½	26.7	15½	48.70	22½	70.7
2	6.28	9	28.27	16	50.26	23	72.25
2½	7.85	9½	29.84	16½	51.83	23½	73.82
3	9.42	10	31.4	17	53.40	24	75.4
3½	10.99	10½	32.98	17½	54.97	24½	76.9
4	12.56	11	34.55	18	56.54	25	78.54
4½	14.13	11½	36.12	18½	58.11	25½	80.11
5	15.7	12	37.70	19	59.69	26	81.68
5½	17.28	12½	39.27	19½	61.26	26½	83.25
6	18.85	13	40.84	20	62.8	27	84.82
6½	20.12	13½	42.4	20½	64.4	27½	86.39
7	21.99	14	43.98	21	65.97	28	87.96
						35	109.95

Diameter in inches & half.	Circumference in inches and parts.	Diameter in inches & half.	Circumference in inches and parts.	Diameter in inches & half.	Circumference in inches and parts.	Diameter in inches & half.	Circumference in inches and parts.	Diameter in inches & half.	Circumference in inches and parts.
35½	111.52	41½	130.37	47½	149.22	53½	168.	59½	186.92
36	113.00	42	131.94	48	150.79	54	169.61	60	188.19
36½	114.66	42½	133.51	48½	152.36	54½	171.21	60½	190.
37	116.23	43	135.	49	153.93	55	172.78	61	191.63
37½	117.81	43½	136.65	49½	155.5	55½	174.35	61½	193.2
38	119.38	44	138.24	50	157.	56	175.92	62	194.77
38½	120.9	44½	139.8	50½	158.65	56½	177.5	62½	196.35
39	122.52	45	141.37	51	160.23	57	179.	63	197.92
39½	124.1	45½	142.94	51½	161.79	57½	180.61	63½	199.49
40	125.66	46	144.52	52	163.36	58	182.21	64	201.
40½	127.23	46½	146.	52½	164.93	58½	183.78	64½	202.63
41	128.8	47	147.65	53	166.5	59	185.35	65	204.2

EXAMPLE.

Required the circumference of a circle of 7 inches diameter. See the above Table; in column 1st, is 7 inches diameter, and against that, in column 2d, is 21.99, or what might be considered 22.

The following Rules, taken from the "Engineer's Text Book," are inserted for the convenience of the practical carpenter.

TO FIND THE AREA OF A CIRCLE.

Rule 1.—Multiply half the circumference by half the diameter, and the product will be the area.

Rule 2.—Square the diameter, and multiply that square by the decimal .7854 for the area.

Rule 3.—Square the circumference, and multiply that square by the decimal .07958.

TO FIND THE WEIGHT OF LEAD.

Rule.—Find by calculation the number of cubic inches in the piece, and multiply the sum by .41015, and the product will be the weight in lbs.

TO FIND THE WEIGHT OF BRASS.

Rule.—Find the number of cubic inches in the piece. Multiply by .3112, and the product will be the weight in pounds.

TO FIND THE WEIGHT OF WROUGHT IRON.

Rule.—Find the number of cubic inches in the piece, and multiply by the weight of 1 cubic inch, which is .2816, and the product is the weight in pounds.

TO FIND THE WEIGHT OF CAST IRON.

The multiplier is .2607, weight of a cubic inch.

SPECIFICATIONS

Of materials and labor suitable for the erection of the Italian Villa, Design I.

The specifications given below may be adapted, with some alterations, to almost any building of the same character. The Villa for which these specifications were originally drawn, was designed for William M. Bickford, Esq., of Worcester, Mass., which he is now erecting, and is similar to Design I. It cannot be expected that we should publish all the details for such a dwelling; hence, the references made to plans not found in this work.

SIZE OF HOUSE.

The house is to be of such dimensions as to admit of the rooms being finished as large as they are represented on the plans.

CELLAR.

The cellar to extend under the whole house, and to be eight feet from the bottom to the top of the underpinning. The wall, two feet six inches thick at the bottom and one foot eight inches at the top, to be made of large block stone well laid, and to be pointed with good lime mortar; to be carried up with a good face to the bottom of the underpinning with stone, and thence, on the inside of the underpinning, up to the sills, with brick-work. In those places where the underpinning sets out from the sills, under the porches or porticos, the wall is to be carried up to the sills, in place of the underpinning, with eight inch brick-work. The cellar to be divided, as per plan, with a brick wall eight inches thick, commencing at the bottom with *hard burnt* brick;—to be brick piers twelve inches square, to support the sills, where they are marked on the plan;—to have a drain, not less than eight inches square, well stoned and covered; also, doors in the partition walls, to afford a passage from one apartment to another, and a door from without, having good curb-stones and stone steps; the drain and doors to be located in such places as the owner may direct.

UNDERPINNING.

The underpinning to be two feet eight inches in height, and of fine hammered stone, well set, with the upper edge straightened and ends squared; the ends next to the cellar windows quoined. That part of the underpinning under the porticos to be of the same height as the other, and to rest on a dwarf wall commencing three feet below the surface of the ground. The front steps and buttresses to be of the same kind of stone and finish as the underpinning.

FRAMING.

The sills to be of the best chestnut timber, and the rest of the frame of the best northern hard pine, free from large knots and shakes. The floor joists jointed crowning, and the posts, studs, and girts jointed straight on their outer edges; the whole frame to be braced in every part where it is necessary.

The floor timbers in the *back part* may be one inch less in depth than in *front*.

The sizes of the timbers suitable for this house are given below:

	Inches.
Outside sills,	8×8
Cross sills,	9×8
First floor joists,	$10 \times 2\frac{1}{2}$
Posts, main part,	8×6
Posts, back part,	7×5
Studs, main part,	6×2
Girts, main part,	8×6
Studs, back part,	5×2
Girts, back part,	7×5
Second floor joists,	$9 \times 2\frac{1}{2}$
Plates, all around,	7×6
Third floor joists,	8×2
Beams, or Upper Girts,	8×6
Rafters, main part,	7×3
Rafters, back part,	6×3
Furring, on the ceiling,	3×1
Partition, first story,	4×2
Partition, second story,	3×2
Partition, back part,	3×2
Braces,	4×5

COVERING.

The outside to be well boarded with planed unmatched boards, of soft or white pine, thoroughly nailed, and sheathed with good eastern boards, well seasoned, well nailed, and smoothed to a *straight edge*;—the sheathing boards not to exceed five inches in width,—the joints matched and well painted with white lead and linseed oil; the corners at the angles of the house mitred together. For the finishing of sheathing around the windows, and for making the cornice, battlement, bracket, frieze, and gutters, see plan.

ROOFS.

The roofs, including those of the porticos, to be *first* covered with square-edged boards, about six inches wide, planed to an even thickness, the joints being left open about one eighth of an inch, and *then* with *tin* of the best quality and workmanship; the tinning to be continued through the gutters, to the edge of the cornice. The chimneys to be properly leaded, and every other place about the roofs where it is necessary.

FLOORS.

The under floors to be made of good northern pine boards, planed, matched, and well nailed; the upper floors of good floor boards free from large knots and shakes, and not to exceed eight inches in width, well nailed, and *cut in against the mop-boards*. The floor in the kitchen to be made of Georgia pine, well oiled and varnished; those in the drawing-room and parlor, traversed and made perfectly straight and level.

PARTITIONS.

The partitions to be made of good stock, jointed to such width as is given in the table, set *edgewise*, and bridged in two places. Those partitions around the closets and rooms of minor importance, may be set *flatwise*. All the partition joists, and all the furrings, set one foot from centre to centre.

The house to be divided into rooms throughout, as shown on the plan.

WINDOWS.

In first story, main part, each window, twelve lights, 24 by 14, in second story, each window, twelve lights, 20 by 14, excepting the one over the balcony in front, of fifteen lights, nine in the lower casement. In first story, *back* part, lights 16 by 12; in second story, lights 15 by 12.

All the sashes to be made of pine, one and seven eighths inches thick, and double hung with pulleys, weights, cords, &c., of the best quality.

The glass, in front windows, to be French plate; all the other, Redford crown glass, except that in back part, which is to be second quality of Redford, or Saranac.

PLASTERING.

The first and second stories of main part to be lathed and plastered with two coats of brown mortar, made perfectly even, and hard finished. The first and second stories of *back* part to be lathed and plastered with two coats, and the ceilings hard finished. The parlor, drawing-room, dining-room, vestibule, and entry, to have a small cornice; also, centre-pieces; one in the parlor, two in the drawing-room, one in the dining-room, one in the vestibule, and one in the entry. The bath-room and conservatory sheathed all around with planed and matched boards.

CHIMNEYS.

The chimneys, commencing at the bottom of the cellar with *hard-burnt* brick, to be carried up and *topped out*, as shown on the plan, with *pressed* brick;—to be as many fire-places as the owner may require, each having a separate flue extending to the top of the chimney.

The parlor, drawing and dining rooms, each to have marble chimney-pieces and hearths; the other hearths to be of pressed brick. The kitchen chimney to be fitted for a cooking-range, and a copper boiler, with an iron door, which will hold not less than thirty gallons; and to have a good-sized oven with a cast-iron door; to be an ash-pit formed in the basement of the chimney, having two cast-iron doors, one above and the other below.

HEIGHT OF STORIES.

The first story of main part to finish thirteen feet; the second story, twelve feet.

The first story of *back* part to finish eleven feet; the second story, ten feet. The attics unfinished, and without floors. Cupola as per plan.

PORTICOS.

The porticos in front to be made as per plan and elevation; see, also, details. The floors to be made of Georgia pine, one inch and a half thick, and four inches wide, with openings of one eighth of an inch; the timbers or bearings placed not more than eight inches apart. The under-pinning to be on a level with that of the house. (See elevation and plan.) The *whole* front edge of the floors of the porticos to be about six inches thick; the roofs, like those on the house, to have small tin gutters in the

top of the cornice. The columns, cornice, and all the other finish, as per plan.

FOLDING SHUTTERS.

The parlor and drawing-room to have folding shutters on the inside of the windows, divided into four parts vertically, and three horizontally. The shutters made of the best Eastern stock, well seasoned, and well hung, with trimmings and fastenings to correspond with the doors.

CHINA CLOSET.

China closet, located as per plan, with drawers on two sides, and with shelves, cupboards, and doors to suit the proprietor. Store-room fitted up with cupboard and shelves.

DOORS.

Doors in first story, main part, 7 feet 3 inches by 3 feet 3 inches, and 1 3-4 inches thick. In second story, doors 7 feet by 3, of the same thickness as the former. In first story, *back* part, doors 6 feet 10 inches by 2 feet 10 inches; in second story, 6 feet 8 inches by 2 feet 8 inches, and 1 1-2 inches thick in each story. Outside doors, 1 7-8 inches in thickness. For the form, see plan.

Here let the student or builder specify the quality of the doors, trimmings, &c.

STAIRS.

Front stairs, located as per plan, with mahogany railing and scroll; the railing and stairs to continue to the cupola, made of the best stock and workmanship.

DOOR AND WINDOW FINISH.

Finish for doors, windows, &c., in the parlor, drawing-room, and hall, both above and below, to be the same as represented on the plan. To be the same kind of finish, with the exception of the cornice, and some slight variations in size, in all the other rooms of main part. In the *back* part, a plain finish with a band moulding is all that is necessary.

BLINDS.

Blinds to all the windows in the house, well hung, and secured by proper fastenings; the lower part of each blind to have movable shades or slats. Painted with four coats, the last two of Paris green.

PAINTING.

All the exterior of the building to have three good coats of German white lead and best linseed oil, put on at proper times. The *interior*, excepting the floors, to have the same number of coats, of the same quality, neatly put on.

SINK AND FIXTURES.

Sink to be located, as shown on the plan, with two good copper pumps, one for soft, and the other for hard water, connected with two pipes, leading, one to the well of 1 3-4 inches calibre, and the other to the cistern of 1 1-2 inches calibre. The pipe that leads to the well to be tinned on the inner surface the whole length, and as far on the *outer* surface as it hangs in the water in the well. The cistern to be composed of brick and cement, and situated in the back cellar; to be good pipes attached to the conductors to carry the water to the cistern, and a pipe of a calibre not less than 1 1-2 inches, to convey the water from the sink to the drain.

WATER WORKS.

A cistern, situated in the bath-room, six feet six inches from the floor, to be sufficiently large to contain five hundred gallons, and made of two thicknesses of plank, with a space of four inches between them, the space to be filled with tan, or any other substance that will prevent the water from freezing in the cistern. The spaces between the studs of the exterior walls of the bath-room filled with brick-work; the ceiling covered with moss or hair to the depth of eight or ten inches, and overlaid with boards.

The cistern to be supplied with water by a force-pump in the wash-room near the boiler, and a pipe 1 1-2 inches in diameter, so constructed as to draw the water from the cistern in the cellar and force it, as, also water from the boiler, to the bathing-tub, as well as to the cistern in the bath-room. Also, a small sink in the bath-room, with a pipe and faucet for the purpose of drawing water from the upper cistern. The pipe-box, placed perpendicularly in the partition, reaching from the upper cistern to the cellar, should be large enough to permit all the pipes to pass, viz., the receiving pipe, discharging pipe, and a large pipe connected with the cistern above, the last not less than two inches in diameter, extending to the cellar, then divided into branches three fourths of an inch in diameter, carried along in the cellar under the chambers, then up in the partitions to sinks prepared for the purpose, which may be in the form of furniture; each sink to have a small discharging pipe.

A CATALOGUE

OF THE PRINCIPAL STYLES OF ANCIENT TEMPLES, ARRANGED UNDER ONE HEAD, FOR THE CONVENIENCE OF THE STUDENT.

Amphiprostyle. — A term applied to a temple having a portico or porch on the rear as well as in the front, but with no columns at the sides. This species of temple never exceeds three columns in the front and four in the rear. It differed from the temple in *antis*, in having columns instead of ante at the angles in the portico.

Areostyle. — One of the five proportions used by the ancients for regulating the intercolumniations or intervals between the columns in porticos and colonnades.

Arcuated style. — A term used by the French architects to denote the mode of proportioning the intervals between columns employed in those edifices in which the Perrault method of the pedestal upon pedestal is adopted.

Diastyle. — That distance between columns which consists of three diameters, or more, but less than four.

Distyle. — In ancient architecture, a temple having four columns in front, and a double range of columns on each of its sides.

Eustyle. — See Chalcidicum.

Hypæthral. — A building or temple without a roof. The temples of this description mentioned by Vitruvius under the name hypæthros, were decastyle columns on each front, and surrounded the cella double portico as in dipteral temples. The cella was without roof, wherein the ancients had erected a second portico of two tiers of columns, one above the other.

Monostyle. — A term applied to a range of columns, or to a building which consists only of two columns.

Peristyle. — A range of columns surrounded by a periphery, portico, or colonnade.

Pteroma. — The space between the cella and the peristyle.

Pycnostyle. — A term applied to those temples which stand in close contact with each other.

Pseudodipteral. — A term applied to those temples which have the columns in front and rear corresponding with the cella, but not in the flanks. It is evident that the pseudodipteral temple differs from the dipteral only in the omission of the inner range of columns on the sides, for the walls of the cella have not room to stand between the columns, as in the dipteral temple, but are placed in a direct line with the inner columns of the front and rear.

Pycnostyle. — See Chalcidicum.

Systyle. — See Chalcidicum.

A GLOSSARY
OF
ARCHITECTURAL TERMS.

FROM M'GIBBON'S CYCLOPÆDIA

A.

ABACUS. The upper member of a capital of a column, and serving as a covering to the whole of the other members. Properly the abacus is a square member, but in the Tuscan and Doric orders it is circular, and in the Ionic and Corinthian orders it is sometimes made circular on the plan, and sometimes hollowed out in the sides.

ACADEMY. Properly, the building adjoining to the Academy of Athens, for the residence of the head of the house.—Also, a School of Arts. But others restrict the term to such buildings as are erected by the Royal Academy, for the purposes of that institution, in pursuance of the Act of Parliament, by which that body was incorporated.

ACANTHUS. A species of thistle, found in various parts of the East. It differs widely from the species found in this country, which the Greeks and Romans used for the leaves of the Corinthian capital.

ACROTERIA. The upper part of a wall at the end of a Grecian building, or at the side of the pediment, and detached from the rest of the work.

ACUTE ANGLE. A term used in Gothic architecture, and which is always less than a right angle.

ADYTUM. A term applied to the Holy of Holies, or innermost part of the temple, which was appropriated to the priests alone, and into which the people were not allowed to enter.

AGGER. A term used by the Roman military writers, to denote the mound or rampart which they threw up round the camp, for the purpose of defence.

AGORA. The name given by the Greeks to the open space in the centre of their towns, which was surrounded by porticoes, and used as a place of assembly for the people, and for the transaction of business.

AILE. A term used in Gothic architecture, to denote the side of a church, whether it be separated from the nave by columns, or by a wall.

AIR-HOLE. A hole made in a wall, for the purpose of admitting air into a cellar, or other place.

ALA. A term used by the Roman writers on military architecture, to denote the wings of the army, when drawn up in battle array.

ALE-KNIGHT. See *Knight*.

ALEMBIC. A vessel used in chemistry, for the purpose of distilling.

ALLEY. A term used in Gothic architecture, to denote the aisle of a church.

ALTAR. The name given by the Greeks and Romans to the table on which they offered up their sacrifices to the gods. The altar was generally placed in the temple, but sometimes it was placed in the open air, and sometimes in the vestibule.

ANCONES. Blocks placed on the corners of the cornice, and used to hide the joints with the roof.

ANGLE COLUMN. In ancient Greek and Roman architecture, the four columns which were placed at the corners of the portico, and at the front and extreme rear of the temple.

ANGLE TRIGLYPH. In Doric architecture, the triglyph which is placed at the corner of the frieze. In ancient Greek and Roman architecture, the four triglyphs which were placed at the corners of the front and extreme rear of the temple.

ANGLE VOLUTE. The scroll under which an abacus or other member is supported, and which is placed at the corner of the capital; it is also called the diagonal volute.

ANNULET. A term applied to the horizontal members of the Doric capital; it is also called the quadrangular fillet, or listel, and is sometimes called the taenia.

ANTA (plural ANTÆ). The pilasters or square piers placed at the corners of temples. There are three kinds of antæ, the first is the simple or unadorned antæ, the second is the antæ with bases and capitals, and the third is the antæ with bases, capitals, and shafts.

ANTEFIXÆ. A term used by the Roman writers on architecture, to denote the ornaments placed on the cornice, to hide the joints of the tiles.

ANTEPAGMENTUM. A term used by the Roman writers on architecture, to denote the door-cheeks or posts, on which the doors turned. It is also called the antepagmentum.

APODYTERIUM. A term used by the Roman writers on architecture, to denote the room in the thermæ or public baths, in which the people undressed themselves.

APOPHYGE. The curve by which the shaft of a column is united to the fillet or astragal at the top and bottom. The former is called the apophyge of contraction, and the latter the apophyge of diminution. Apophyges are sometimes ornamented.

APSIS. A term used by the Roman writers on architecture, to denote the vault or concave roof of a temple, which was generally semicircular, and was sometimes called the testudo. It was also applied to the tribunes or seats of the judges in the basilicæ.

AQUEDUCT. A conduct or channel for conveying water from one place to another; but more particularly applied to structures for the purpose of con-

...verse the waters of ...ant springs across valleys, ...the like.

Arabesque — A style ...ed the Arabian style. The term is ...ecially used to denote that sort of ...ament which consists of ...ls, pavements, and ...ing. (A. of Moorish buildings.)

Arc — Is a part of a ...ference of a circle or other curve line. The ...ure of a circle is the measure of the ...h formed by two straight lines drawn from any two points ...to the centre of the circle.

Arch — A ...ved opening or recess ...with arched ...and ...upon.

Week — A ...ular account of Books of ...any kind made or kept ...h the laws of some country, ...ted supposed, or ...ther by mutual pro... The usual ...tance ...on or account which ...ks are ...ed the ...

Architrave — The lowest of the three principal ...ers of the entablature of ...ical architecture, and ...ts upon the ...h immediately above ...h, and ...s the ...ing ...

Architect — An ...ual who ...ns and ...s the ...ion of ...ings, and ...ly the ...ings ...ed for ...ic ...ses. ...ecture is ...ly ...ed into ...ral ...ches, ...ch as ...ry, ...

Area — In ...ral ...ry, the ...ace ...ded ...n ...ines ...ch ...ch ...ch

Cabinet — A closet or room in a garden, set apart for study, or the preservation of curiosities.

Cable — The lowest member of the shaft of a round pillar.

Cabriole — A term applied to the curved leg of a chair, table, &c.

Cadre — A frame for a picture, &c.

Caen Stone — A species of stone found in Normandy, of which the cathedral of Caen is built.

Caisson — A chest filled with bombs, powder, &c. to be sprung under ground, or placed in the ditch of a fortification.

Calcarium — A stove or oven for drying and burning bricks.

Calefactory — A room in monasteries, in which was a fire, for the use of the monks in winter.

Calendar — A table, or register of the days of the year, distributed into months, weeks, &c. according to the course of the sun and moon.

Calidarium — A bath-room in ancient baths, where the vessels for containing hot water were placed.

Caliduct — A pipe or channel for conveying hot water from the boiler to the different parts of the building.

Calotte — A cupola.

Camber — Slightly arched, as the beam of a floor, in contradistinction to flat.

Cambrel — The gambrel roof of a house.

Camerated — Arched, or vaulted.

Camerlingo — The treasurer of the Pope's household.

Camisade — A night attack.

Campanile — A bell-tower, whether part of the church or detached.

Campo Santo — A cemetery.

Canal — A channel for water, for the purposes of navigation, or for ornament in a garden.

Candelabrum — A branch for lights.

Candlestick — A utensil for holding a candle. The antique candlesticks are of various forms, and generally consist of a foot, a shaft, and a socket for the candle.

Cannelure — A channel or hollow, in the form of a flute, in the shaft of a column.

Cantalever — A projecting bracket, or modillion, to support a cornice, balcony, &c.

Cantoned — Applied to a square pier, or column, when it is flanked with pilasters, columns, or other projections.

Capella — A chapel.

Capitolium — The temple of Jupiter Optimus Maximus, on the Capitoline hill at Rome.

Cappa — A hood, or covering for the head.

Capriccio — A picture in which the painter has represented a number of objects according to the dictates of his fancy, without regard to nature or propriety.

Caravansera — A large building, with a spacious court in the middle, for the reception of travellers and their horses.

Carbuncle — A precious stone, of a red colour, supposed to shine in the dark.

Carcass — The timber-work of a building, before it is lathed and plastered.

Carnation — The painting which represents the naked parts of the body.

Carnelian — A precious stone, of a red colour.

Carpenter's Gothic — A corruption of the pointed style of architecture. Buildings of this kind present a confused medley of pointed arches, or rather openings for windows and doors.

Carrara — A white statuary marble, much used in the time of the Romans.

Carriage — A passage for vehicles, under a gateway, or in the middle of a house.

Cartoon — A design, or drawing, on paper, and sometimes on canvas, of the full size of the intended picture, for the use of the artist in painting in fresco, mosaic, tapestry, &c.

Caryatides — Figures of women dressed in long robes, used instead of columns or pilasters, to support an entablature.

Cascade — A fall of water, from a height, over steps, or broken ground.

Cascine — A farm-house, with a garden, for the residence of the Grand Duke of Tuscany, near Florence.

Cassine — A country-house, or villa.

Cassoon — A sunk panel in a ceiling, or vault.

Castellated — Built in the manner of a castle, with towers and battlements.

Castellum — A reservoir, or head of water, from which water is distributed to different parts of a city, by pipes.

Castle — A fortified residence of the nobility.

Catacombs — Subterraneous cemeteries, consisting of long galleries, with niches for the reception of dead bodies.

Catafalco — A temporary structure, erected in churches, for the performance of funeral obsequies.

Catapulta — An engine for throwing stones, darts, &c.

Cathedral — The principal church of a province, diocese, or bishopric, in which the bishop has his throne.

Cavalier — A fortification, whose position commands the ground round it.

Cavetto — The moulding in the form of a concave quarter of a circle.

Cella — In ancient temples, the part of the temple within the walls. It was also called the *naos*, or body of the church.

Cenotaph — A monument to the memory of a deceased person, whose body is deposited elsewhere.

Chamfer — Pieces taken off the solid corner of a piece of timber, &c. Ornamental chamfers are sometimes cut on the edges of wood and stone, and are called by the French *lozenges*.

Chancel — That part of a church, usually enclosed with rails, where the communion-table stands.

Chantry — A chapel endowed for the maintenance of a priest to perform divine service daily for the souls of the founder and his family.

Chapel — A building dedicated to the performance of divine worship.

Capital — The top, head, or uppermost part of a column, which stands on the shaft or the astragal and base.

Capriccio — An ornament used in the pointed style of architecture. It consists of two curved pendants, each of which is terminated by an ornament resembling the point of a lance.

Caryatides — An outward figure of a robed virgin, used instead of pillars or columns.

Cascade — A work, generally of stone, and sometimes of wood, in the form of steps, over which the water falls in a broken sheet.

Cassoon — A range of coffers. If the coffers are both square and oblong, it is called *cassoon and coffer*; when they are only square, it is called *cassoon* simply; when they are circular, it is called *cassoon and compartment*; when they are circular in the centre, and square at the corners, it is called *cassoon and pendentive*; when they are hexagonal, octagonal, &c. it is called *cassoon and panel*; when they are of a lozenge form, it is called *cassoon and lozenge*; when they are of a triangular form, it is called *cassoon and triangle*; when they are of a circular form, it is called *cassoon and circle*; when they are of a semicircular form, it is called *cassoon and semicircle*; when they are of a semi-elliptical form, it is called *cassoon and semi-ellipse*; when they are of a semi-oval form, it is called *cassoon and semi-oval*; when they are of a semi-hexagonal form, it is called *cassoon and semi-hexagon*; when they are of a semi-octagonal form, it is called *cassoon and semi-octagon*; when they are of a semi-polygonal form, it is called *cassoon and semi-polygon*; when they are of a semi-circular form, it is called *cassoon and semi-circ

Cupola — A term, properly speaking, which is confined to the *undercroft*, or ceiling part of a dome.

Curb-stones — Those in the foot paving of a street which divide it from the carriage paving, above which they are or ought to be, raised.

Curtail Step — The last or bottom step by which stairs are ascended, ending at the farthest point from the wall in which it is placed in a scroll, perhaps taking its name from the step curving round like a curtail.

Custom House — An edifice erected for the receipt of the customs' duties, payable on the importation and exportation of merchandize.

Cyma — A moulding taking its name from it contour, resembling that of a wave, being hollow in its upper part, and swelling below. Of this moulding there are two sorts, the cyma recta, and the cyma reversa. By the workmen the cyma recta is called ogee.

Cymatium — The upper moulding of a cornice.

D.

Dado — The die, or part in the middle of the pedestal of a column, between the base and cornice. It is of a cubic form, whence the name of die.

Dentils — The small, square blocks or projections in the Ionic mouldings of cornices in the Ionic, Corinthian, Composite, and, occasionally, Doric orders. Their breadth should be half their height.

Detail — A term usually applied to the drawings on a larger scale, for the use of builders, and generally called *working drawings*.

Diameter — A straight line passing through the centre of a geometrical figure, as that of a circle, ellipse, or hyperbola.

Diagonal or Stair — Such as are sold between the upper flight or such as have no well hole and in which the rail and balusters of both progressive and retrogressive flight fall in the same vertical plane.

Dome — The spherical, or other figure, convex roof over a circular or polygonal building.

Dorick Order.

Dormer — A window placed on the inclined plane of the roof of a house, the frame being placed vertically on the rafters.

Dormitory — A large sleeping room, capable of containing many beds.

Drawing — The representation of a building on paper, explanatory of the various parts of the interior and exterior, by means of plans, elevations, and sections, drawn to a scale, by which all the parts are exhibited in the true proportion as the parts of the edifice intended to be represented.

Drip — *See Cheek.*

Drops — The truncated cones in the Doric order, used under the triglyphs in the architrave.

E

Eaves. — The lowest edges of the inclined sides of a roof, which project beyond the face of the walls.

Echinus. — The same as the *ovolo*, or *quarter round*, though the moulding is only properly so called when carved with eggs and anchors.

Edifice. — A word synonymous with fabric, building, erection. The word is, however, more commonly employed to denote architectural erections distinguished for grandeur, dignity, and importance.

Egyptian Architecture — See

Elevation — A geometrical projection drawn on a plane perpendicular to the horizon.

Ellipse or Ellipsis — One of the conic sections produced by cutting a cone entirely through the curved surface in oblique position, so that the ellipse, like the circle, is a curve that returns into itself, and cofigured by one line or a point.

Entablature. — The whole of the parts of an order above a column. The entablature is divided into three parts; viz., architrave, frieze, and cornice.

F.

Fabric — A general term applied to a large and important building.

Façade — The face or front of any building towards a street, court, or how in the place. A term however, more commonly applied to only the principal front.

Facia or Fascia — A flat member of an order or of a building, less than the band or broad fillet.

Festoon — A carved representation of flowers, drapery, and fruit, hung in a curve between two points at unequal heights.

Fillet — A little band, face, or the termination extremity of other members. In geometry, any line contained by a plane, and a certain line of curves.

Fillet — A little band, face, or the termination extremity of other members. In geometry, any line contained by a plane, and a certain line of curves.

Finial — A terminating ornament of foliage or other decoration.

Fixture — Anything so attached to real property as to be by the act of removal, or injured with, the land or building to which it is annexed.

Flank — That part of a return body which *pubs* the front.

Flooring Lath and Plaster. — Flooring of three coats, viz., of the first or *pricking up*, the second *floating*, or finishing, and the last or *set stuff*.

Flooring Work — Flooring, rendered partially plane by means of a.

Forum — In ancient architecture a public market, or place where the people assembled to transact business. The forum was an open space surrounded by portico, part where the more important market places, other parts for public meetings of the inhabitants, and other parts for courts of justice; the latter was also sometimes used for shows of gladiators.

Fresco. — See *Painting.*

Fresco Painting — A method of painting by mere pigmentary colour with water to temper it only, by which reflections as permanent as the wall itself.

Fretted, or Fret — A species of ornament consisting of one or more small fillets, meeting in vertical and horizontal directions.

Frieze — That member or the second feature of an order, between the architrave and cornice.

Furring — The name of those pieces or laths upon the edges of any number of timbers in a range when such timbers are out of the surface they were intended to form, either from their gravity, or in consequence of an original deficiency of the timbers in their depth.

G.

Gallery. — An apartment of a house, for different purposes. A common passage to several rooms in any upper story is called a gallery.

Glossary. — That which explains the terms used in any art or science.

Glyph. — A channel or hollow, the term being usually applied to the triglyphs of the Doric order.

Gnomon. — The pointer or hand of a dial; the style which shows the hour by the shadow it casts.

Gothic. — See *Do*.

H.

Hand-Rail of a Stair. — A rail raised upon slender posts, called balusters, to prevent persons falling down the well-hole, as also to assist them in ascending and descending.

Hectastyle. — A temple of a hundred feet in length.

Hexagon. — In geometry, a plain figure bounded by six straight lines, which, when equal, constitute the figure a regular hexagon.

Horizontal Cornice. — The level part of the cornice or pediment under the two inclined cornices.

Hospital. — A building for the reception of the sick poor, for insane persons, and, sometimes, for particular diseases.

Hot House. — A general term for the glass buildings used in gardening, and including stoves, greenhouses, and conservatories.

House. — A human habitation, or place of abode for a family.

House, (Double and Single.) — A term applied to arches, the first of which has the upper and lower ends the balance of by weights for raising and lowering, and the last, when only one, namely the lower one, is balanced over the pulley.

I.

Ice House. — A subterranean depot for preserving ice during the winter.

Imperial. — A species of dome, whose profile is pointed towards the top, and waving towards the base, thus forming a curve of contrary flexure.

Impost. — The capital of a pier or pilaster which receives an arch.

Inclined Plane. — One of the five simple mechanical powers, whose theory is deduced from the ascent or position of bodies.

Intercolumniation. — The distance between two columns measured at the lower part of their shafts.

Ionic Order. — See

J.

Jambs. — The sides of an aperture which connect the two faces of a wall.

Joiner. — The artisan who joins wood by glue, framing, or nails, for the finishings of a building.

Joinery. — The practice of framing or joining wood for the internal finishings of houses.

K.

Kitchen. — The apartment or office of a house wherein the operations of cookery are carried on.

L.

Label. — In Gothic architecture, the drip or hood-moulding over an aperture, when it is returned square.

Labyrinth or Fret. — A fret with many turnings; in the form of a labyrinth.

Lawns, or Lawns. — An instrument said to have been used in England by the builders of the modern cottages, for the purpose of more than ordinary accuracy in the upper part of a building.

Lintel. — A horizontal piece of timber or stone over a door, window, or other opening, to discharge the superincumbent weight.

List or Listel. — The same as fillet.

Lobby. — An enclosed space surrounding or communicating with one or more apartments.

Lock. — A well-known mechanism, consisting of springs and bolts, for fastening doors, drawers, chests, &c.

Lozenge. — The same as *Rustic*.

M.

Mansion. — A large house; a term more usually applied to one in the country.

Mouldings. — Any part of an edifice, or any moulding in a collection of mouldings, as of those in a cornice, capital, base, &c.

Metope. — The square space in the frieze between the triglyphs of the Doric order.

Minaret. — A church to which an ecclesiastical tribunal has been erected attached. The name is sometimes applied to steeples.

Minute. — A term given to the sixtieth part of the lower diameter of a column, being a subdivision of the module in the former parts of the order.

Mitre, or Mitre. — *Bevel*.

Modillion. — A projection under the cornice of the Corinthian order, in imitation of a bracket.

Moorish Architecture. — The style of building peculiar to the Moors and Arabs.

Mosaic. — A modern term for enriching objects by the inlayment of small cubes of glass, stone, marble, shells, &c.

Mosque. — A Mohammedan temple or place of worship.

Mouldings. — The ornamental contours or forms applied to the edges of the projecting or receding members of an order.

Mullion, or Muntin. — In pointed architecture, the vertical post or bar which divides a window into several lights.

Mutule. — A projecting ornament of the Doric cornice, which occupies the place of the modillion in the other orders, and is supposed to represent the end rafters.

N.

Nave. — The body of a church, or place where the people assemble, distinguished from the choir or partition of the floor to the principal entrance.

Neck of a Capital. — The space in the Doric order between the astragal on the shaft and the annulet of the capital.

Newel. — The upright cylinder or pillar round which, in a winding staircase, the steps turn, and are supported from the bottom to the top.

Niche. — A cavity or hollow place in the thickness of a wall, for the reception of a statue, vase, &c.

Notch-board. — A board which is grooved or notched for the reception and support of the ends of steps in a staircase.

O.

Ogee. — A moulding, the same as the *Cyma reversa*.

Orchestra — The enclosed part of a music-room, wherein the instrumental and vocal performers are seated.

Order — An assemblage of parts, consisting of a base, shaft, capital, architrave, frieze, and cornice.

Oriel, or Oriel Window. — A large bay or recessed window in a hall, church, or other apartment. Originally projecting from the wall, and lighted a chapel or other private room, but afterwards used for any large window.

Oval — A curvilinear figure, whose boundary is a curve line returning into itself, and of which the ellipse or mathematical oval, and all figures resembling it, are each with different properties.

Ovolo — A convex moulding, whose lower extremity recedes from a perpendicular line drawn from the upper extremity.

P.

Palace. — In England, a name given to the dwelling of a king or queen, a prince, and a bishop.

Panel — A flat surface, whose sides are inserted into the grooves of a thicker surrounding frame.

Parapet — A small wall or other material for protection on the sides of flat roofs, quays, or high terraces.

Parlour — A room for conversation, which, in the old monasteries, was one of the lowers and nearest of the lower chambers to the hall. At present it is used for a common sitting-room, in a house, as distinguished from a drawing-room.

Pedestal — The third division or principal member of columns. It is the solid body placed upon the stylobate, or upon the plinth, when there is one, and supporting the column, pilaster, or statue.

Pendentive — The concave which reaches the arch of a dome to the square on which it stands.

Pendent — An ornament suspended from the summit of Gothic vaulting, very often elaborately decorated.

Perspective — The science which teaches the art of representing objects on a definite surface, so as from a certain position to affect the eye in the same manner as the objects themselves would.

Piazza — A square open space, surrounded by buildings. The term is very frequently, and very erroneously, used to denote a walk under arches.

Piles — Large timbers driven into the earth, upon whose heads the foundation of a building is immediately laid to rest.

Pillar — A column of angular form, always disengaged, and always observing to the projection of the entablature the distinction between a column and a pier.

Pinnacle — A conical or pyramidal ornament, usually small and terminating.

Plan — The projection of the horizontal section of a building, showing the thickness and disposition of the walls.

Plinth — The square member at the bottom of the pedestal; it would be, however, very often used peculiarly to denote the

Plinth — The lowest square member of a base of a column or pedestal.

Pointing — The raising out the mortar from between the joints of brick-work, and repairing the same with new mortar.

Porch. — An exterior appendage to a building, forming a covered approach to one of its principal doorways.

Portal — The arch over a door or gate; the framework of a gate, the door gate, when there are two of different sizes, at one entrance.

Portico — [illegible]

Post — An upright piece of timber set in the earth.

Pulpit — The enclosed [illegible] It is principally used in churches and chapels, to specify the [illegible] The difference of the [illegible] And [illegible] is in fact the [illegible] with [illegible]

Projection — [illegible] a body on a [illegible] [illegible] [illegible]

Rotunda or Rotundo — A building circular on the interior and exterior, such as the Pantheon at Rome.

Rough-cast — A species of plaistering used on external walls, which consists of a mixture of lime, small shells or pebbles, and occasionally fragments of glass, and broken tiles.

Round Office — A private or bedchamber where the floor of the room is covered with the pelt of a bear or otter.

Rubble Work — A mode of building in which irregular pieces of the quarries are filled in the interstices between the more smooth work in the union of the chief blocks or pieces.

S.

Sash — A frame for holding the glass of windows, and so formed as to be raised or depressed by means of pulleys.

Scantle — The diminished end of a piece of timber in order to fit the mortise.

Scarcity — The hollow moulding on the face of a column, below the fillets of the tore. It receives the name from being so much in the shadow.

Scroll — A convolved or spiral ornament, variously introduced.

Sculpture — The art of imitative forms by chiselling and working away solid substances.

Shaft — The cylindrical part, or trunk or body, of a column, between the base and the capital.

Sill — See *Cill* and *Layer*.

Soffite, Soffit, or Soffito — A cornice, the lower surface of a cornice, &c. A term to denote the under horizontal face of the architrave between the column; the under surface of the cornice of a entrance.

Splayed — A term applied to whatever has one side making an oblique angle with the rest.

Stadium — In ancient architecture, an open space wherein the athletæ or wrestlers exercised themselves, and in which they contended for the prizes. It seems to differ from the place or area where the public games were celebrated, often formed a part of the gymnasia. The word is also denotes a measure of length, answering to the furlong, or 125 paces.

Stalled — A large section attached to a church chiefly intended for seating the choir.

Stile — The vertical part of a piece of framework into which the rails are framed, the ends of the rails are fixed by mortises and tenons.

Story — One of the vertical divisions of a building, a series of apartments on the same level.

Surface — A term applied to objects to express a combination of length and breadth, without thickness.

Surface — A general term for the exterior of any body.

Symmetry — A system of proportion of the parts, from which results from that part the agreement of all the rest.

T.

Tænia — The fillet which separates the Doric frieze from the architrave.

Temple — Generally an edifice erected for the public exercise of religious worship.

Torus — A large moulding whose section is semi-circular, used in the bases of columns. The only difference between it and the astragal is in the size, the astragal being much smaller.

Transom — A horizontal cross bar in a window of two lights in height. If a window have no transom, it is called a clear story window.

Trefoil — In Gothic architecture, an ornament consisting of three cusps in a circle.

Trellis — A reticulated framing made of thin bars of wood, for covering windows where air is required to be admitted, &c.

Triglyph — The vertical tablets in the Doric frieze, ornamented on the two vertical edges, and having two channels in the middle, which are double channels to those at the angles.

Truss — A combination of timber framing, so arranged, that, if suspended at two given points, and charged with one or more weights at certain others, no other would be thrown perpendicularly upon any other except by timbers exerting equal and opposite forces.

Turret — A small tower, often crowning the angle of a wall, &c.

Tympanum — The naked face of a pediment included between the level and raking mouldings.

U.

Underpinning — Bringing a wall up to the ground sill. The term is also used to denote the temporary support of a wall whose lower part or foundations are defective, and the bringing up new sound work which is to rest in future to rest.

V.

Vane — A plate of metal, shaped like a banner, fixed on the summit of a tower or steeple, to show the direction of the wind.

Vault — An arched roof, over an apartment, concave towards the void, whose section may be that of any curve in the same direction.

Venetian Door — A door having side lights on each side for it, and an entrance hall.

Venetian Window — One formed with three apertures, separated by slender posts from each other, the two the centre one is much larger than the two on the sides.

Vestibule — An apartment which serves as the medium of communication to another room or scenes out of one.

Vestry — An apartment in, or attached to, a church, for the preservation of the sacred vestments and utensils.

Villa — A country-house for the residence of an opulent person.

Volute — A spiral scroll which forms the principal feature of the Ionic and Composite capitals.

W.

Well-hole. — In a flight of stairs, the space left in the middle, beyond the ends of the steps.

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